

Module 3: Voting Theory

This material corresponds to
chapters 9-12 of the textbook,
For All Practical Purposes

VOTING THEORY CHAPTERS 9-12

TIME FRAME: 12 days

ENDURING UNDERSTANDINGS:

Group decision making is a strategic encounter and citizens must be aware of difficulties that can arise under different voting systems.

ESSENTIAL (ASSESSMENT) QUESTIONS:

1. Can an election be determined without challenges with three or more candidates?
2. What are the fairness conditions and how do various voting methods violate one or more of these fairness doctrines?
3. How would approval voting influence a presidential election if there were more than two candidates?

CRMS:

PS/Reasoning: 1.2
Communication: 2.3
Probability/Statistics: 6.2

AT THE END OF THE MODULE STUDENTS WILL KNOW AND BE ABLE TO:

1. Describe various voting procedures.
2. Explain why a voting method violates a fairness doctrine.
3. Analyze how a voting method affected an election outcome.

PRE-REQUISITE KNOWLEDGE/SKILLS: Percentages, fractions, and decimals.

PRE-ASSESSMENT ACTIVITY: None

ACTIVITIES:

Introductory problem: **My Favorite Mariner Commercial**
Voting Conditions Analysis with video - *Casting Your Ballot*
Reading assignment on **2000 Election**
HiMAP worksheets

POST-ASSESSMENTS:

Voting: Stolen Votes?
Open note unit test (Worksheet 7 from HiMAP)

LITERACY STRATEGIES INTRODUCED:

Voting Theory on 2000 election reading and reporting

RESOURCES:

COMAP: *Casting Your Ballots Elections*

(DVD/CD-ROM package, price \$59.99, from www.comap.com)

Includes **The Mathematical Theory of Elections** worksheets and **The Impossible Dream: Election Theory** video.

Project TIME Resource DVD: **Seattle Mariners Commercials** video clip

Contest in modeling from HiMCM – problem can be found at:

www.comap.com/highschool/contests/himcm/2000problems.html

Results from contest winners can be found at:

www.comap.com/highschool/contests/himcm2000results.pdf

DAILY PLAN

Pick at least two days each week (starting after the WAMAP Pretest) to begin class with a warm-up question from the “Algebra Skills Review” found at the end of the Preface to this Teacher Resource Manual. (This is part of a long-term review process to maintain and improve students’ algebra skills and college readiness.)

Day 1

- WAMAP College Readiness Pretest.

Day 2

- Introductory problem: **My Favorite Mariner Commercial** (show video clip from Project TIME Resource DVD).
- Collect data.
- Concept Map review.
- Section 1 of HiMAP – print **The Mathematical Theory of Elections** from the *Casting Your Ballots* CD-ROM.

HW: Worksheets 1 and 2 from HiMAP CD-ROM.

Days 3-4

- Go over homework.
- Assign **Voting Conditions Analysis** groups and respective topics.
- Show “*Impossible Dream*” video from the COMAP *Casting Your Ballots* DVD, have students watch video while they take Cornell Notes – 23 minutes.
- **Voting Systems and Voting Conditions Analysis** Worksheet: Assign the four voting systems referred to in FAPP (Borda Count, sequential pair-wise voting, plurality with run-off, and the Hare System) and the three conditions of voting systems (independence of irrelevant events, Pareto Condition, and Monotonicity) to seven groups.

HW: Groups prepare a 10 minute presentation and fill out analysis worksheet.

Day 5

- One group presents Plurality with run-off elections.
- Students practice with Mariners data.
- One group presents Monotonicity voting using data.
- One group presents Sequential Pair-wise voting using data.
- Students practice with Mariners data.
- One group presents Pareto Condition using data.
- Students take Cornell Notes.

HW: Worksheet 3 (From HiMAP CD-ROM)

Days 6-7

- One group presents Borda Count using data.
- Students practice using Mariners data.

- One group presents Hare System using data.
- Students practice using Mariners data.
- One group presents Independence of Irrelevant Events using data.
- Students practice using Mariners data.
- Students take Cornell Notes.

HW: Worksheet 4 (From HiMAP CD-ROM); Read articles: *United States Presidential Election, 2000* and *The United States Electoral College* and answer the reading questions.

Day 8

- Homework review of Worksheets 3 and 4
- Direct instruction on Condorcet Criteria with Graph Theory representation: Arrow's Theorem and Proportional Representation and Approval Voting
- Students take Cornell Notes

HW: Complete reading assignment and questions on Worksheets 5 and 6 (from HiMAP CD-ROM).

Day 9

- Hand out **Stolen Votes: Electoral College Reform** group project and grading rubric. This project comes from HiMCM 2000, a high school mathematics contest in modeling. There are samples of acceptable work included for the instructor.
- Students begin to work on project.

HW: Worksheets 5 and 6 (From HiMAP CD-ROM)

Day 10

- Review homework.
- Students begin **Voting: Stolen Votes?** project.

HW (due at end of class): Student groups hand in brief description of their new elections system (2 sentences or so, one idea per group).

Day 11

- Finish project.
- Groups review their own project with rubric.

HW (due at end of class): Each group turns in sample rubric with the rating of their project so far.

Day 12

- Open note unit test (use Worksheet 7 from HiMAP CD-ROM) – 15 minutes.
- Peer review of projects.

LAST UNIT / Experience	CURRENT UNIT Unit 6: Voting		NEXT UNIT / Experience
Unit / Homework Schedule <input type="checkbox"/> <input type="checkbox"/>	<div style="text-align: center;"> <p>Is about . . .</p> </div>		UNIT VOCABULARY
UNIT SELF TEST QUESTIONS	<ol style="list-style-type: none"> 1. Can an election be determined without challenges with three or more candidates? 2. What are the fairness conditions and how do various voting methods violate one or more of these fairness doctrines? 3. How would approval voting influence a presidential election if there were more than two candidates? 		

INTRODUCTORY PROBLEM:
MY FAVORITE MARINER COMMERCIAL
Answer Key

PURPOSE: This opening activity shows that when there are more than two candidates in an election there can be confusion and/or disagreement on who actually best represents the voters.

MY FAVORITE MARINER

Show the four commercial clips. Note: the DVD has 10 commercials, any four would work. However, the first four commercials are humorous and might be best for a high school class. Assign commercial one (Ichiro batting) as commercial *A*. *B* is the pitcher/flowers commercial. *C* is well-rounded person commercial. *D* is Australia/Austria commercial.

After watching the four Mariner commercials, students write their choices on the ballot. Students will rank the top 3 commercial as 1st (Most Favorite) 2nd (Favorite) and 3rd (Least Favorite). Turn in the ballots to the teacher to sort and post the results.

There are 24 possible ballots that you can receive ABC, CAB, and DCB (are a few examples). Write those combinations on the board and write down the number of ballots that were turned in for each of those choices. Below are just two methods for determining a winner. These two methods are the most common and should be familiar to students. Students are doing a 2-minute write while you sort and post results.

2-Minute Write: How many different ballots can four candidates produce? How many different ballots can four candidates produce? Keep the 2-minute write in your notebook. 24 ballots, 120 ballots.

After the results have been posted, have the students answer the following questions:

1. Which commercial has the majority of votes?
2. What percentage of the first place votes did this commercial receive?
3. What types of elections award the winner to the one with the most votes? Senate or representative at both state and federal level (not the president). Mayor and other public offices.
4. Does this commercial have a plurality? (Over 50% of the 1st place votes)
5. If we were to give 5 points for first place, 3 points for second place votes, and 1 point for third place votes, which commercial would win the election?
6. What types of elections award the winner to the candidate with the most points like in the scenario above? Usually this shows up in sports competitions, such as most valuable player.

Students will check their answers with their group. The answers should be kept with their notes.

INTRODUCTORY PROBLEM: MY FAVORITE MARINER COMMERCIAL

PURPOSE: This opening activity shows that when there are more than two candidates in an election there can be confusion and/or disagreement on who actually best represents the voters' preference.

MY FAVORITE MARINER

After watching the four Mariner commercials, write your choices on the ballot. Rank the top 3 commercials as 1st (Most Favorite) 2nd (Favorite) and 3rd (Least Favorite). Turn in the ballots to the teacher to sort and post the results.

2-Minute Write: How many different ballots can four candidates produce? How many different ballots can five candidates produce? Keep the 2-minute write in your notebook.

After the results have been posted, answer the following questions:

1. Which commercial has the majority of votes?
2. What percentage of the first place votes did this commercial receive?
3. What types of elections award the winner to the one with the most votes?
4. Does this commercial have a plurality? (over 50% of the 1st place votes)
5. If we were to give 5 points for first place, 3 points for second place votes, and 1 point for third place votes, which commercial would win the election?
6. What types of elections award the winner to the candidate with the most points like in the scenario above?

Check your answers with your team mates. Keep these problems in your notes also.

THE MATHEMATICAL THEORY OF ELECTIONS

From the HiMAP Library CD-ROM, print out **The Mathematical Theory of Elections** by Joseph Malkovitch.

Copy Worksheets 1 and 2 for the students' homework. Discuss section 1 of the module with the class.

VOTING CONDITIONS & VOTING SYSTEMS ANALYSIS ACTIVITY

The purpose of this activity is to have groups research different voting methods and then teach the class about the particular methods. Their report should show the major features of the system, where it is used, and the flaws in the system. Students will get their information from the *For All Practical Purposes* textbook.

This activity begins with students watching the “*Impossible Dream*” video while taking Cornell Notes. Then seven groups need to be formed, of three or four students. One group will research the Borda Method, one group the plurality with run off, one group the sequential pair-wise, and one group the Hare Method. The remaining three groups will present different properties of election systems. One group will research Independence of Irrelevant alternatives, one group will research the Pareto Condition, and one group will research Monotonicity. As groups are presenting, the rest of the class takes Cornell Notes.

The instructor will need to make copies of the worksheets on the following pages. There are two different worksheets, but each student only needs one of them, depending on which analysis that group has been assigned.

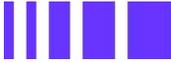
The next day the groups will start their presentations. The class practices each method with the Favorite Mariner Data and then works on the homework if time remains after the three or four presentations per class. Plurality with run-off and sequential pair-wise groups present the first day along with the groups researching Pareto Condition and Monotonicity. The next day the other two systems are presented along with the group on Independence of Irrelevant alternatives. Each group should be given 10 minutes total time, including the time that the students practice with the Mariner Data. If students do not have enough time, groups could run over into the third day.

Here is an example that you might give to each group to demonstrate their particular voting system during their 10 minute presentations. Each technique gives a different winner; having the students discover this fact leads to great discussions. The top row indicates how many people had chosen that particular ranking.

The “story line” behind the problem is that a group of people are asked to rank from first choice to fifth choice which ‘sport’ they would rather watch.

H is for Hockey
 C is for Cross Country
 S is for Swimming
 T is for Tennis
 R is for Rock Climbing

Votes	45	40	15
1 st	H	R	C
2 nd	O	C	O
3 rd	S	O	S
4 th	C	S	R
5 th	R	H	H



VOTING SYSTEMS ANALYSIS WORKSHEET

Answer Key

VOTING SYSTEM: PLURALITY RUNOFF METHOD	
<p>Significant Components:</p> <p>Plurality with run off is systems where there is a run-off of the two candidates with the most first place votes. If there is a tie then the run-off is between the tied candidates.</p>	<p>Where is it used:</p> <p>Used in primary elections to whittle down the field to two candidates</p>
<p>Challenges:</p> <p>Doesn't satisfy Monotonicity.</p>	<p>Other interesting facts:</p>

VOTING SYSTEM: SEQUENTIAL PAIRWISE VOTING	
<p>Significant Components:</p> <p>Sequential pairwise starts with an agenda (a listing of candidates in some order) and pits the first two candidates against each other, the winner against the third and the loser going out, so on down the list until only one candidate is left.</p>	<p>Where is it used:</p> <p>Arises in legislative matters.</p>
<p>Challenges:</p> <p>The order of candidates in the list can affect the winner. Doesn't satisfy the Pareto condition. Might be a problem getting one winner with an even number of voters.</p>	<p>Other interesting facts:</p>



VOTING SYSTEM: BORDA COUNT	
<p>Significant Components:</p> <p>Assign points for each place on the preference list (2 points for 1st, 1 points for 2nd, and 0 point for third if there were three candidates for instance) Add total points to get winner.</p> <p>It is a ranking method.</p>	<p>Advantages:</p> <p>Used in track meets and finding hall of fame candidates in different sports.</p>
<p>Challenges:</p> <p>Doesn't satisfy independence of irrelevant alternatives.</p>	<p>Other interesting facts:</p> <p>A person with the most 1st place votes might be the least favorable to the majority of people in a plurality vote, not so in Borda Count.</p>

VOTING SYSTEM: HARE SYSTEM	
<p>Significant Components:</p> <p>The Hare system arrives at a winner by repeatedly deleting candidates that are least preferred (being at the top of the fewest ballots). If a single candidate remains after all are eliminated that candidate is the winner.</p>	<p>Where is this used:</p> <p>Used to pick Australia for Olympics.</p>
<p>Challenges:</p> <p>There can be a tie for winner. Also doesn't satisfy Monotonicity.</p>	<p>Other interesting facts:</p>

VOTING CONDITIONS ANALYSIS WORKSHEET

Answer Key

ELECTION CONDITION: MONOTONICITY	
<p>Significant Components:</p> <p>This is a condition that says if an election is held and a winner is decided (say A) then if another election is held and all the ballots are the same except that someone might move A higher in his list, A should still be the winner.</p> <p>The example on page 354 shows where this is not the case.</p>	<p>What are some voting systems that don't have this quality?</p> <p>The Hare system and Plurality with Run-of both don't satisfy Monotonicity.</p>
ELECTION CONDITION: PARETO CONDITION	
<p>Significant Components:</p> <p>This is a condition which says if everyone compares one candidate (say A) over another candidate (say B) then B should not be the winner of the election. The example on page 353 shows an example where this doesn't happen. Everyone prefers B to D but D is the winner in a sequential Pairwise voting.</p>	<p>What are some voting systems that don't have this quality?</p> <p>Sequential Pairwise voting</p>
ELECTION CONDITION: INDEPENDENCE OF IRRELEVANT EVENTS	
<p>Significant Components:</p> <p>It is satisfied if it is impossible for a candidate to move from a non-winner to winner status unless at least one voter reverses the order in which he had the candidate and the winning candidate.</p> <p>Example in book p. 351 shows a Borda where B is a non winner to begin with but after two people change their vote (still has B above A); B all of a sudden becomes the winner. Also note that B has less first place finishes but is still the winner.</p>	<p>What are some voting systems that don't have this quality?</p> <p>Borda Count</p>

VOTING SYSTEMS ANALYSIS WORKSHEET

Research the voting system you have been assigned and record all of the information that applies in the chart below. Review the chart with your group and develop a plan to teach the rest of the class your system. You will have 10 minutes to teach your concepts to the other students in the class.

VOTING SYSTEM:	
Significant Components	Where is it used
Challenges	Other interesting facts
Instructional Plan:	

VOTING CONDITIONS ANALYSIS WORKSHEET

Research the election condition you have been assigned and record all of the information that applies in the chart below. Review the chart with your group and develop a plan to teach the rest of the class what you learned. You will have 10 minutes to teach your concepts to the other students in the class.

ELECTION CONDITION:	
Significant Components:	What are some voting systems that don't have this quality?
Instructional Plan:	

WORKSHEETS 3 & 4 FROM HiMAP

Print copies of Worksheets 3 and 4 from **The Mathematical Theory of Elections** on the HiMAP CD-ROM for your students. These are meant for students to do as homework.

You can also find solutions to those worksheets on the CD-ROM.

IMPORTANT INFORMATION ABOUT USING WIKIPEDIA

Wikipedia is a great source of initial information - the new processes they are developing for vetting the entries seems to be working. You still have to be careful. It is not an academic site - but it is quickly replacing the old encyclopedias as a reference for many students - so we need to teach them to use it but with a critical eye!

Explain to the students that Wikipedia can be good for finding out quick information such as the basic rules of rugby or a way to get initial information on a topic, but it is an unacceptable citation source for a research paper. Sometimes the information is inaccurate and at other times it is incomplete. The new processes being used to monitor what is added to the website seems to be working, but do not consider the site an academic one. Students should never use Wikipedia as a source.

One of the history instructors at Green River Community College, Mark Thomason, wrote the following about the Wikipedia article on the 2000 election that is included here:

For the most part, the Wikipedia article doesn't say anything dramatically wrong, but neither does it offer any particular insight to the 2000 election in general, or the Florida recount in particular. If the students are interested in a purely mathematical approach to representation versus the electoral college, then crunching numbers from almost any presidential election (congressional districts, statewide, national), provides some useful insights to the representativeness of the electoral college. (Those numbers, by the way, are readily available. Not sure about congressional district breakdowns, the FEC has all the others.)

ASSIGNED READING QUESTIONS

Description and Answer Key

On the next several pages are two articles about U.S. Elections: *United States Presidential Election, 2000* and *The United States Electoral College*. There is also a handout of questions on these materials. The instructor should copy all of these and distribute them to the students to work on for homework.

The articles are taken from Wikipedia, a free online encyclopedia that can be edited by anybody with internet access. Please be sure to read the notes on the next page about using material from Wikipedia and to share that information with your students.

Here are sample answers to some of the reading questions:

1. Summarize the dilemma(s) in the description of the 2000 US presidential election.

The candidate with the most votes doesn't necessarily win. Conflicts have to be argued in court. Time and recounts procedures vary from state to state.

2. What were the disputes that are identified by the article?

Recounting the ballots, the ballots themselves, the Supreme Court not allowing more time for recount, the representative raising objections to the electoral vote of Florida.

3. Describe the election process as you know it that is used by the United States to elect a president. Can representatives object to the electoral votes of a state? How and what becomes of an objection when it is properly introduced?

Citizens vote for their candidate in each state. Each state is assigned an electoral vote number (the number of representatives plus 2). This is to help the small states preserve some power. A candidate needs 270 votes to win.

PRESIDENTIAL ELECTION, 2000, AND THE ELECTORAL COLLEGE READING QUESTIONS

1. Summarize the dilemma(s) in the description of the 2000 US presidential election.
2. What were the disputes that are identified by the article?
3. Describe the election process as you know it that is used by the United States to elect a president. Can representatives object to the electoral votes of a state? How and what becomes of an objection when it is properly introduced?
4. Why do you think a president is elected in this way?
5. Do you think there should be a better way to elect a president? What would that look like? (The final project for this module deals with developing a new method of electing a president.)

United States Presidential Election, 2000

From Wikipedia, the free encyclopedia

United States presidential election, 2000

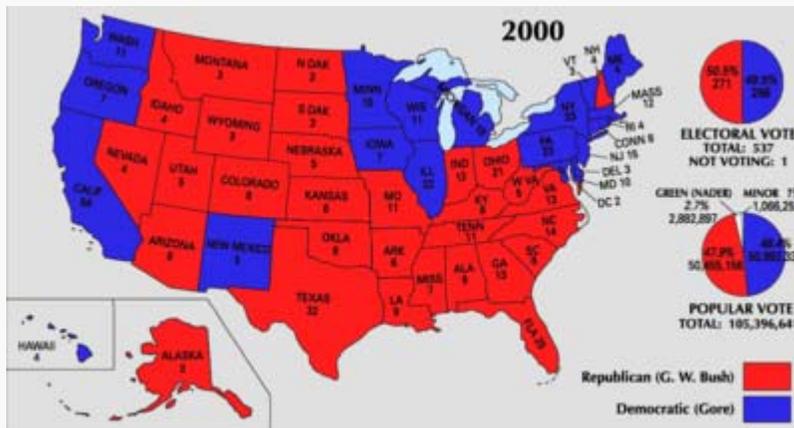
7 November 2000

Winner

Runner up



Nominee	George W. Bush	Al Gore
Party	Republican	Democratic
Home State	Texas	Tennessee
Running mate	Richard B. Cheney*	Joe Lieberman
Electoral Vote	271	266
States Carried	30	20+DC
Popular Vote	50,460,110	51,003,926
Percentage	47.87%	48.38%



Presidential election results map. Red denotes states won by Bush/Cheney, Blue denotes those won by Gore/Lieberman.

Before Election

Bill Clinton
Democratic

After Election

George W. Bush
Republican

In the **United States presidential election of 2000** Republican George W. Bush gained the US Presidency over Democrat Al Gore after the United States Supreme Court in *Bush v. Gore* found in a 5-4 vote in favor of Bush.

Democratic candidate Al Gore, the Vice President of the United States, received more popular votes but fewer electoral votes than Republican candidate George W. Bush, the Governor of Texas. The election was held on November 7, 2000.

On election night, the news media first declared Al Gore the winner in the state of Florida based on exit polls, then gave the election to George Bush, before deciding the race was too close to call.

A month of controversial court challenges and recounts followed, until the Supreme Court of the United States in *Bush v. Gore* agreed 7-2 that there were possibly Equal Protection issues in using different standards of counting ballots in different counties. However, 2 of those 7, Justices Steven Breyer and David Souter, later decided that there wasn't a significant Equal Protection issue. Regardless, 5 of the 9 justices found that there was a significant Equal Protection issue and ordered that the recounts be stopped. Justice Ginsburg wrote a dissenting opinion, joined by Justices John Paul Stevens, Steven Breyer, and David Souter. Bush was certified as the winner in Florida by a margin of 537 votes, thereby being credited with more electoral votes than Gore. It was the third time in American history that a candidate won the vote in the Electoral College without receiving a plurality of the popular vote; it also happened in the elections of 1876 and 1888. In 1824 John Quincy Adams received a plurality in neither the popular vote nor the Electoral College vote and was selected President by the U.S. House of Representatives.

The General Election Campaign

In the campaign, Bush criticized the Clinton administration policy in Somalia, where 18 Americans died in 1993 trying to sort out warring factions, and in the Balkans, where United States peacekeeping troops perform a variety of functions. "I don't think our troops ought to be used for what's called nation-building". Bush said in the second presidential debate. Ralph Nader was the most successful of third-party candidates, drawing 2.74% of the popular vote. His campaign was marked by a traveling tour of "super-rallies"; large rallies held in sports arenas like Madison Square Garden, with retired talk show host Phil Donahue as master of ceremonies. After initially ignoring Nader, the Gore campaign made a big publicity pitch to (potential) Nader supporters in the final weeks of the campaign, downplaying Gore's differences with Nader on the issues and claiming that Gore's ideas were more similar to Nader's than Bush's were,

noting that Gore had a better chance of winning than Nader. On the other side, the Republican Leadership Council ran pro-Nader ads in a few states in an effort to split the "left" vote. In the aftermath of the campaign, many Gore supporters blamed Nader for drawing enough would-be Gore votes to push Bush over Gore, labeling Nader a "spoiler" candidate.

The sharpest differences among partisan groups came on the topic of morality. Already by 1992, Republicans were campaigning much more vigorously and vociferously than Democrats or independents on "hot button" social issues concerning what some proclaimed as the moral decay of society, in the form of permissive attitudes toward sex, abortion, gays and lesbians, and secularism. The difference grew larger by 2000, especially if one adds together the moral decay category and the category having to do with corruption and scandals in Washington. Morality was mentioned most frequently by Republicans as the "single most important problem" facing the nation. Therefore during his campaign Bush frequently referred to restoring moral integrity not only to the White House but to the nation as a whole. Gore on the other hand studiously avoided the Clinton scandals, as did Lieberman, even though Lieberman had been the first Democratic senator to denounce Clinton's misbehavior. Gore avoided appearing with Clinton, who was shunted to low visibility appearances in areas where he was still popular.

The Election



George W. Bush



Al Gore

As the returns came in on election night (November 7), it became clear that the presidential election was unusually close. With the exception of Florida, Bush carried the Southern states by comfortable margins, and he also scored wins in Ohio, Indiana, most

of the rural Midwestern farming states, and most of the Rocky Mountain States. Gore balanced Bush by sweeping the Northeastern United States (with the sole exception of New Hampshire), most of the Upper Midwest, and the Pacific Coast states, including California. As the night wore on it became clear that while a handful of small-to-medium sized states were extremely close, it was the State of Florida that would decide the winner of the election. As the final national results were tallied the following morning, Bush had clearly won a total of 246 electoral votes, while Gore had clearly won 255 votes (270 votes were needed to win). Two smaller states - New Mexico (5 electoral votes) and Oregon (7 electoral votes) - were still too close to call. It was Florida (25 electoral votes), however, that the news media focused their attention on. Mathematically, Florida's 25 electoral votes became the key to an election win for both candidates, and although both New Mexico and Oregon were declared in favor of Gore over the next few days, Florida's statewide vote took center stage even as voting continued in western states. The outcome of the election was not known for more than a month after the balloting ended because of the extended process of counting and then recounting Florida's presidential ballots.

Florida

Main article: United States presidential election, 2000 Florida results

At approximately 7:50 pm EST on election night, the television news networks declared that Gore had carried Florida's 25 electoral votes. They based this prediction on exit polls. However, in the actual vote tally Bush took a wide early lead in Florida, and by 10 pm the networks had retracted their earlier prediction of a Gore victory and placed Florida back into the "undecided" column. At approximately 2:30 am, with some 85% of the votes counted in Florida and Bush leading Gore by over 100,000 votes, the television networks declared that Bush had carried Florida, and had been elected President. However, most of the remaining votes to be counted in Florida were located in three heavily Democratic counties - Broward, Miami-Dade, and Palm Beach - and as their votes were reported Gore began to rapidly gain on Bush. By 4:30 am Gore had narrowed Bush's margin to less than 2,000 votes, and the television networks all retracted their predictions that Bush had won Florida and the Presidency. Gore, who had publicly conceded the election, now withdrew his concession and announced that he would wait for a recount in Florida before making his next move. By the morning of Wednesday, November 8 Bush's margin in Florida had dwindled to about 500 votes. The margin was small enough to trigger a mandatory recount in the state. In addition, Gore asked for hand recounts in four counties (Broward, Miami Dade, Palm Beach, and Volusia), as provided for under Florida state law. This set into motion a series of recounts (portions by machine, and portions by hand), questions about portions of the Florida vote, and finally lawsuits.

These ultimately resulted in a December 12 5-4 United States Supreme Court decision which ended the Florida recounts and allowed Florida to certify its vote. The vote was certified by Katherine Harris, the Republican Secretary of State who had publicly supported Bush during the campaign. Additionally, Bush's younger brother, Jeb Bush, was the governor of Florida and this led to allegations that Harris and Bush had somehow

manipulated the election to favor the governor's brother. Bush's margin of victory in Florida was officially placed at 537 votes (out of more than 5.8 million cast), making it the closest presidential election in the history of the state. The nine members of the Supreme Court voted along partisan lines in the split decision with the two swing voters (Justices O'Connor and Kennedy) siding with the three conservatives (Chief Justice Rehnquist and Justices Scalia, and Thomas) outvoting the Court's four liberals (Justices Ginsburg, Souter, Stevens, and Breyer). Due to all of these factors, the 2000 presidential campaign has become one of the most controversial, and disputed, elections in American history.

Post Recount

After Florida was decided, Texas Governor George W. Bush became President-elect and began forming his transition committee. In a speech on December 13, Bush said he was reaching across party lines to bridge a divided America, stating that "the President of the United States is the President of every single American, of every race, and every background."

On January 6, 2001, a joint-session of Congress met to certify the electoral vote. Twenty members of the House of Representatives, most of them Democratic members of the Congressional Black Caucus, rose one-by-one to file objections to the electoral votes of Florida. However, according to an 1877 law, any such objection had to be sponsored by both a representative and a senator, and no senator would co-sponsor these objections. Therefore, Gore, who was presiding in his capacity as President of the Senate, ruled each of these objections out of order.

Bush took the oath of office on January 20, 2001.

In the aftermath of the election, independent recounts were conducted by The Miami Herald and USA Today, confirming that Bush had in fact carried the state of Florida.

However, The Media Consortium hired the National Opinion Research Center to examine 175,010 ballots that were never counted in Florida. The investigation took 8 months and cost \$900,000.

National Results

Vice President Al Gore came in second in the electoral vote, but received 543,816 more popular votes than Bush. Such a close national contest contributed to the controversy of the election; the vote tally in Florida remains a point of dispute.

Further information: United States presidential election, 2000 Florida results
Gore failed to win the popular vote in his home state of Tennessee, which both he and his father had represented in the Senate. Had he won Tennessee, he could have won the election without Florida. Gore was the first major party presidential candidate to have lost his home state since George McGovern lost South Dakota in 1972

	Gore Gain	Gore Deficit or Lead
Certified by Katherine Harris		-537
Valid votes found after certification	+59	-478
Correctly marked paper ballots	+493	+15
Full punches	+100	+115
Poorly marked paper ballot	+309	+424
3-corner chads	+208	+216
2-corner chads	-111	+105
1-corner chads	-45	+60
Dimples with sunlight	+88	+148
Dimples	-41	+107

Presidential Candidate	Party	Home State	Popular Vote	Electoral Vote	Running Mate		Running Mate's Home State	Running Mate's Electoral Vote	
			Count	Percentage					
George W. Bush	Republican	Texas	50,460,110	47.9%	271	Dick Cheney	Wyoming	271	
Al Gore	Democratic	Tennessee	51,003,926	48.4%	266	Joe Lieberman	Connecticut	266	
Ralph Nader	Green	Connecticut	2,883,105	2.7%	0	Winona LaDuke	Minnesota	0	
Pat Buchanan	Reform	Virginia	449,225	0.4%	0	Ezola B. Foster	California	0	
Harry Browne	Libertarian	Tennessee	384,516	0.4%	0	Art Olivier	California	0	
Howard Phillips	Constitution	Virginia	98,022	0.1%	0	Curtis Frazier	Missouri	0	
John Hagelin	Natural Law/Reform	Iowa	83,702	0.1%	0	Nat Goldhaber	California	0	
Other^(b)			54,652	0.1%	0	Other^(b)		0	
Total			105,417,258	100.0%	538	Total		538	
Needed to win		270					Needed to win		270

Source (Popular Vote): Leip, David. [2000 Presidential Election Results](#). *Dave Leip's Atlas of U.S. Presidential Elections* ([August 7, 2005](#)).

Source (Electoral Vote): 2000 Electoral Vote Totals. *Official website of the National Archives*. (August 7, 2005).

^(a) *One faithless elector from the District of Columbia, Barbara Lett-Simmons, abstained from voting in protest of the District's lack of a voting representative in United States Congress. (D.C. has a non-voting delegate to Congress.) She had been expected to vote for Gore/Lieberman.*

^(b) *Candidates receiving less than 1/2000 of the total popular vote.*

See also: United States presidential election, 2000 (detail)

The United States Electoral College

From Wikipedia, the free encyclopedia

The **United States Electoral College** is a term used to describe the 538 Presidential Electors who meet quadrennially to cast the electoral votes for President and Vice President of the United States; their votes represent the most important component of the presidential election. The Presidential Electors are elected by the "popular vote" on the day traditionally called "election day." Presidential Electors meet in their respective state capitol buildings (or in the District of Columbia) 41 days following "election day," never as a national body. At the 51 meetings, held on the same day, the Electors cast the electoral votes. The "electoral college," like the national convention, is an indirect element in the process of electing the President.

Provisions for the mechanics of presidential elections were established by Article Two, Section One, of the United States Constitution. The 12th Amendment provided that each Elector vote separately for president and vice president. Today, the mechanics of the presidential election are administered by the National Archives and Records Administration via its Office of the Federal Register.

Electors are chosen in a series of state elections held on the same day ("election day"). The number of electoral votes of each state is the sum of its number of U.S. Senators (always two) and its U.S. Representatives; the District of Columbia has three electoral votes. In each state, voters vote for a slate of pre-selected candidates for Presidential Elector, representing the various candidates for President. State ballots, however, are designed to suggest that the voters are voting for actual candidates for President. Most states use what is termed the "short ballot," in which a vote for one party (such as Democratic or Republican) is interpreted as a vote for the entire slate of Presidential Electors. In these states, with rare exceptions, one party wins the entire electoral vote of the state (by either plurality or majority). Maine and Nebraska choose Presidential Electors using what is termed the "Maine Method," which makes it possible for the voters to choose Electors of different political parties and "split" the electoral vote of these two states.

The Presidential Electors of each state (and DC) meet 41 days following the "popular vote" to cast the electoral votes. The Electors ballot first for President, then for Vice President. On rare occasions, an Elector does not cast the electoral vote for the party's national ticket, usually as a political statement; these people are called "faithless Electors." Each Elector signs a document entitled the "Certificate of Vote" which sets forth the electoral vote of the state (or DC). One original Certificate of Vote is sent by certified mail to the Office of the Vice President.

One month following the casting of the electoral votes, the U.S. Congress meets in joint session to declare the winner of the election. If a candidate for President receives the vote

of 270 or more Presidential Electors, the presiding officer (usually the sitting Vice President) declares that candidate to be the *president-elect*, and a candidate for vice president receiving 270 or more electoral votes is similarly declared to be the *vice president-elect*.

The process has several exceptions and provisos, which are considered in the main body of this article.

The nature of the process and its complication have been critiqued, with its detractors raising several alternative means of electing the president. This issue was revisited following the Presidential Election of 2000 when Democratic candidate Al Gore won the majority of the national vote, but failed to win the majority of the Electoral College.

Advocates of the current system have similarly set forth arguments for its advantages.

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Electoral College mechanics

The election of the President of the United States and the Vice President of the United States is indirect. Presidential electors are selected on a state by state basis as determined by the laws of each state. Currently each state uses the popular vote on Election Day to appoint electors. Although ballots list the names of the presidential candidates, voters within the 50 states and the District of Columbia are actually choosing Electors from their state when they vote for President and Vice President. These Presidential Electors in turn cast the official (electoral) votes for those two offices. Although the nationwide popular vote is calculated by official and media organizations, it does not determine the winner of the election.

Apportionment of Electors

The present allotment of electors by state is shown in the article [List of U.S. states by population](#).

The size of the Electoral College has been set at 538 since the election of 1964. Each state is allocated as many electors as it has Representatives and Senators in the United States Congress. Since the most populous states have the most seats in congress, they also have the most electors. The states with the most are California (55), followed by Texas (34) and New York (31). The smallest states by population, Alaska, Delaware, Montana, North Dakota, South Dakota, Vermont, and Wyoming, have three electors each. Because the number of representatives for each state is determined decennially by the United States Census, the electoral votes for each state are also determined by the Census every ten years. The number of electors is equal to the total membership of both houses of Congress (100 Senators and 435 Representatives) plus the 3 electors allocated to the District of Columbia, totaling 538 electors. A candidate must receive a majority of votes from the Electoral College (currently 270) to win the Presidency. If in either election for President or Vice-President no one receives a majority, the election is determined by Congress (the House votes with each state's delegation casting one vote for presidential candidates, and the Senate votes for vice presidential candidates).

Under the 23rd Amendment, the District of Columbia is allocated as many Electors as it would have if it were a state, except that it cannot have more Electors than the least populous state. The least populous state (currently Wyoming) has 3 Electors, so the District cannot have more than 3 Electors. However, without this restriction, the population of the District of Columbia would still entitle it to only 3 electors. In fact, based on its population per electoral vote, the District of Columbia is the second most highly represented portion of the electorate, after Wyoming.

How States Currently Select Electors

Presidential elector candidates are nominated by their state political parties in the summer before the Election Day. Each state provides its own means for the nomination of electors. In some states, such as Oklahoma, the Electors are nominated in primaries the same way that other candidates are nominated. Other states, such as Virginia and North Carolina, nominate electors in party conventions. In Pennsylvania, the campaign committees of the candidates name their candidates for Presidential Elector (an attempt to discourage faithless Electors). All states require the names of all Electors to be filed with the Secretary of State (or equivalent) at least a month prior to Election Day. However, under the 14th Amendment, candidates who hold a federal office are barred from being electors (an error made, but corrected, before both the 2000 and 2004 elections).

On Election Day, voters cast ballots for slates of Presidential Electors pledged to the candidates for president and vice president. In most states, the candidates who win the popular vote have their entire slate of Electors elected. At the time of the state canvass of the vote, the Secretary of State (or equivalent) signs a special form called the Certificate of Ascertainment which sets forth the people appointed to the office of Presidential Elector, along with the number of votes cast for every party's slate of Elector nominees. These Certificates of Ascertainment are forwarded to the Office of the Vice President to be used to verify that the people who cast the electoral votes are in fact the people who were elected for that purpose.

Two states do not elect the Presidential Electors as a single slate. Maine and Nebraska elect two electors by a statewide ballot and choose their remaining Electors by congressional district. The method has been used in Maine since 1972 and Nebraska since 1991, though neither has split its electoral votes in modern elections.

State Meetings of Presidential Electors

The Presidential Electors meet in their respective state capitals (or DC) 41 days following Election Day, at which time they cast their electoral votes. The "electoral college" never meets as one national body. Although the procedure in each state varies, the Electors generally follow a similar series of steps. The meeting is opened by the election certification official (often the secretary of state), who reads the Certificate of Ascertainment - the document setting forth who was chosen to cast the electoral votes. Those present answer to their name, and they then fill any vacancies in their number. The next step is the selection of a President or Chairman of the meeting, sometimes with a

vice chairman also. The Electors sometimes choose a Secretary, often not an Elector, to take the minutes of the meeting. In many states, political officials give short speeches at this point in the proceedings.

When the time for balloting arrives, the Electors choose one or two people to act as tellers. Some states provide for the placing in nomination of a candidate to receive the electoral votes (the candidate for President of the political party of the Electors). Each Elector submits a written ballot with the name of a candidate for President. In New Jersey, the Electors cast ballots by checking the name of the candidate on a pre-printed card; in North Carolina, the Electors write the name of the candidate on a blank card. The tellers count the ballots and announce the result. The next step is the casting of the vote for Vice President, which follows a similar pattern.

After the voting is complete, the Electors complete the "Certificate of Vote." This document states the number of electoral votes cast for President and Vice President. The state election official usually has pre-printed forms ready, and the tellers usually only write down the number of votes cast for appropriate candidates. Five copies of the Certificate of Vote are completed and signed by each Elector. Multiple copies of the Certificate of Vote are signed, in order to provide multiple originals in case one is lost. One copy is sent to President of the U.S. Senate (the sitting Vice President of the United States) by certified mail.

A staff member of the Office of the Vice President collects the Certificates of Vote as they arrive and prepares them for the joint session of Congress. The Certificates are arranged in alphabetical order and placed in two special mahogany boxes. The states Alabama through Missouri (including DC) are placed in one box, and the states Montana through Wyoming are placed in the second box.

Faithless Electors

Main article: Faithless elector

A faithless elector is one who casts an electoral vote for someone other than whom they have pledged to elect. On 158 occasions, electors have not cast their votes for president or vice president to whom they were pledged. Of those, 71 votes were changed because the original candidate died before the elector was able to cast a vote. Two votes were not cast at all when electors chose to abstain from casting their electoral vote for any candidate. The remaining 85 were changed by the elector's personal interest or perhaps by accident. Usually, the faithless electors act alone. An exception was in 1836 when 23 Virginia electors changed their vote together. In that year, Martin Van Buren's Vice Presidential running mate, Richard Johnson, did not receive the minimum votes to become the Vice President but ultimately won the office on the first ballot by the United States Senate in 1837.

There are laws to punish faithless electors in 24 states. While no faithless elector has ever been punished, the constitutionality of state *pledge* laws was brought before the Supreme Court in 1952 (*Ray v. Blair*, 343 U.S. 214). The court ruled in favor of state laws

requiring electors to pledge to vote for the winning candidate, as well as remove electors who refuse to pledge. As stated in the ruling, electors are acting as a function of the state, not the federal government. Therefore, states have the right to govern electors. The constitutionality of state laws punishing electors for actually casting a faithless vote, rather than refusing to pledge, has never been decided by the Supreme Court. In any event, a state may only punish a faithless elector after-the-fact; it has no power to change his or her vote.

As electoral slates are normally chosen by the political party and/or the party's presidential nominee, electors are usually those with high loyalty to the party and its candidate, and a faithless elector runs a greater risk of party censure than governmental action.

Joint Session of Congress and the Contingent Election

Federal law mandates that Congress assemble in joint session on the sixth day of the calendar year following the meetings of the Presidential Electors to count the electoral votes and declare the winners of the election. The meeting is held at 1:00 p.m. in the hall of the U.S. House of Representatives. The Vice President is expected to preside, but in several cases the President Pro Tempore of the Senate has presided. The Vice President and the Speaker of the House sit at the podium, with the Vice President in the seat of the Speaker of the House. Senate pages bring in the two mahogany boxes and place them on tables in front of the Senators and Representatives. Each branch appoints two tellers to count the vote. Relevant portions of the Certificate of Vote are read for each state, in alphabetical order. If there are no objections, the presiding officer declares the result of the vote and, if applicable, states who was elected President and Vice President. The Senators then depart from the House chamber.

If no candidate for President receives an absolute electoral majority 270 votes out of the 538 possible, then the new House of Representatives is required to go into session immediately to vote for President. In this case, the House of Representatives chooses from the three candidates who received the most electoral votes. Each state delegation has a single vote, decided by majority decision (an evenly divided state delegation is considered to abstain). A candidate receiving the majority of votes of all states (currently 26) is declared the *president-elect*. If no candidate receives a majority, the House proceeds to a second ballot and continues balloting until a candidate receives a majority of the state unit votes. This situation would most likely occur only when more than two candidates receive electoral votes, but could theoretically happen in a two-person contest if each received exactly 269 electoral votes. As of 2007, the Democratic Party controls 26 state delegations, and the Republican Party controls 20.

If no candidate for Vice President receives an absolute majority of electoral votes, then the United States Senate must do the same, with the top two vote getters for that office as candidates. The Senate votes in the normal manner in this case, not by States. If the

Senate is evenly split on the matter, then the sitting Vice President is entitled to cast a tie-breaking vote.

If the House of Representatives has not chosen a winner in time for the inauguration (noon on January 20), then the Twentieth Amendment specifies that the new Vice President becomes Acting President until the House selects a President. If the winner of the Vice Presidential election is not known by then either, then under the Presidential Succession Act of 1947, the Speaker of the House of Representatives would become Acting President until the House selects a President or the Senate selects a Vice President.

As of 2004, the House of Representatives has chosen the President on two occasions, in 1800 and in 1824. The Senate has chosen the Vice President once, in 1837.

WORKSHEETS 5 & 6 FROM HiMAP

Print copies of Worksheets 5 and 6 from **The Mathematical Theory of Elections** on the HiMAP CD-ROM for your students. These are meant for students to do as homework.

You can also find solutions to those worksheets on the CD-ROM.

STOLEN VOTES: ELECTORAL COLLEGE REFORM

Description and Links to Sample Solutions

This project comes from the 2000 High School Mathematical Contest in Modeling (HiMCM). HiMCM is a part of COMAP. You may wish to visit www.comap.com and the contest website (click on the Contest tab and the HiMCM link from the COMAP website) for additional information about these great problem sets.

This project has students design a new method for picking the president. They read about the 2000 election and some of its difficulties and also about the present electoral system. The readings are meant to provide background for this project. Students will definitely need to work in groups since showing how their new system would work on the 1992 results requires some time.

The project requires the students to work together with one recorder. They have two class periods to complete their design. Each group will review a project (not their own) using the grading rubric that follows the project description handout.

You can also find sample solutions for this project at either of the following websites:

http://www.prof2000.pt/users/j.pinto/matematica/acompanhamento/macs/Textos_Macs/Consortium.pdf

or

<http://m3challenge.siam.org/pdf/HiMCM2000.pdf>

Look for the solutions to “Problem B” from that year’s contest.

“STOLEN VOTES?” PROJECT

It is almost election time, and it is time to revisit the electoral vote process. The Constitution and its amendments have provided a subjective method for awarding electoral votes to states. Additionally, a state popular vote no matter how close, awards all electoral votes to the winner of that plurality.

Create a mathematical model that is different from the current electoral system. Your model might award fractional amounts of electoral votes or change the methods by which the numbers of electoral votes are awarded to the states.

Carefully describe your model and test its application with the data from the 1992 election.

The 1992 election data is provided on the next page. Justify why your model is better than the current model.

POPULAR VOTE AND ELECTORAL COLLEGE VOTE BY STATE (1992)

State	George Bush (Republican, TX)			Bill Clinton (Democrat, AR)			Ross Perot (Reform, TX)		
	vote	%	ECV	vote	%	ECV	vote	%	ECV
ALABAMA	804,283	47.9	9	690,080	41.1	-	183,109	10.9	
ALASKA	102,000	40.2	3	78,295	30.8	-	73,481	28.9	
ARIZONA	572,086	38.9	8	543,050	37.0	-	353,741	24.1	
ARKANSAS	337,324	35.8	-	505,823	53.7	6	99,132	10.5	
CALIFORNIA	3,630,566	32.9	-	5,121,249	46.3	54	2,296,004	20.8	
COLORADO	562,850	36.1	-	629,681	40.4	8	366,010	23.5	
CONNECTICUT	578,313	35.9	-	682,318	42.4	8	348,771	21.7	
DELAWARE	102,313	35.6	-	126,054	43.8	3	59,213	20.6	
D OF COLUMBIA	20,698	09.3	-	192,619	86.4	3	9,681	04.3	
FLORIDA	2,171,781	41.0	25	2,071,651	39.1	-	1,052,481	19.9	
GEORGIA	995,252	43.0	-	1,008,966	43.6	13	309,657	13.4	
HAWAII	136,822	37.1	-	179,310	48.6	4	53,005	14.3	
IDAHO	202,645	43.1	4	137,013	29.1	-	130,395	27.7	
ILLINOIS	1,734,096	34.5	-	2,453,350	48.8	22	840,515	16.7	
INDIANA	939,375	41.9	12	848,420	37.8	-	455,934	20.3	
IOWA	504,891	37.5	-	586,353	43.6	7	253,468	18.8	
KANSAS	449,469	39.1	6	389,704	33.9	-	311,316	27.0	
KENTUCKY	617,178	41.5	-	665,104	44.7	8	203,944	13.7	
LOUISIANA	733,386	41.6	-	815,971	46.3	9	211,478	12.0	
MAINE	206,504	30.5	-	263,420	38.9	4	206,820	30.6	
MARYLAND	707,094	35.8	-	988,571	50.0	10	281,414	14.2	
MASSACHUSETTS	805,039	29.2	-	1,318,639	47.9	12	630,731	22.9	
MICHIGAN	1,554,940	36.6	-	1,871,182	44.0	18	824,813	19.4	
MINNESOTA	747,841	32.1	-	1,020,997	43.8	10	562,506	24.1	
MISSISSIPPI	487,793	49.1	7	400,268	40.3	-	105,045	10.6	
MISSOURI	811,159	34.0	-	1,053,873	44.2	11	518,741	21.8	
MONTANA	144,207	35.5	-	154,507	38.1	3	107,225	26.4	
NEBRASKA	343,678	46.8	5	216,864	29.5	-	174,104	23.7	
NEVADA	175,828	35.3	-	189,148	38.0	4	132,580	26.6	
NEW HAMPSHIRE	202,484	38.0	-	209,040	39.2	4	121,337	22.8	
NEW JERSEY	1,356,865	40.9	-	1,436,206	43.3	15	521,829	15.7	
NEW MEXICO	212,824	37.6	-	261,617	46.2	5	91,895	16.2	
NEW YORK	2,346,649	34.1	-	3,444,450	50.1	33	1,090,721	15.8	
NTH CAROLINA	1,134,661	43.5	14	1,114,042	42.7	-	357,864	13.7	
NTH DAKOTA	136,244	44.4	3	99,168	32.3	-	71,084	23.2	
OHIO	1,894,942	38.5	-	1,984,942	40.4	21	1,036,426	21.1	
OKLAHOMA	592,929	42.8	8	473,066	34.1	-	319,878	23.1	
OREGON	475,757	32.8	-	621,314	42.8	7	354,091	24.4	
PENNSYLVANIA	1,791,841	36.3	-	2,239,164	45.4	23	902,667	18.3	
RHODE ISLAND	131,601	29.2	-	213,299	47.4	4	105,045	23.3	
STH CAROLINA	577,508	48.3	8	479,514	40.1	-	138,782	11.6	
STH DAKOTA	136,718	40.8	3	124,888	37.3	-	73,295	21.9	
TENNESSEE	841,300	42.6	-	933,521	47.3	11	199,968	10.1	
TEXAS	2,496,071	40.7	32	2,281,815	37.2	-	1,354,781	22.1	
UTAH	322,632	43.4	5	203,400	27.3	-	183,429	24.6	
VERMONT	88,122	30.6	-	133,592	46.4	3	65,991	22.9	
VIRGINIA	1,150,517	45.3	13	1,038,650	40.9	-	348,639	13.7	
WASHINGTON	731,234	32.3	-	993,037	43.8	11	541,780	23.9	
WEST VIRGINIA	241,974	35.5	-	331,001	48.5	5	108,829	16.0	
WISCONSIN	930,855	37.0	-	1,041,066	41.4	11	544,479	21.6	
WYOMING	79,347	39.9	3	68,160	34.3	-	51,263	25.8	
	39,052,486	37.6	168	44,927,432	43.3	370	19,393,877	18.7	

“STOLEN VOTES?” PROJECT STUDENT GRADING RUBRIC

INTRODUCTION: NEW VS. OLD	
<input type="checkbox"/> 4	Introduction contains: a) the old method of electing a president b) the problems that arise from this method c) a comparison to the new method
<input type="checkbox"/> 3	Introduction is clear, but some of the information about the current method and its problems might be left out. New method is clear.
<input type="checkbox"/> 2	Explanation of new or old system is a little difficult to understand, but includes most critical components.
<input type="checkbox"/> 1	Explanation is difficult to understand and is missing several components or was not included.
PLAYING WITH DATA	
<input type="checkbox"/> 4	The data for 1992 is used to illustrate the how the new method would have affected the election. Work is labeled and easy to understand. There are no calculation errors.
<input type="checkbox"/> 3	The data for 1992 is used to illustrate the how the new method. Data work is organized but some steps in process seem to be overlooked or unclear. Work might contain a calculation error.
<input type="checkbox"/> 2	The data for 1992 is used to illustrate the how the new method, but there is a superficial explanation of how it would affect the election. Work might include several calculation errors.
<input type="checkbox"/> 1	There seems to be little if any data manipulation using the new data.

SUMMARY

<input type="checkbox"/> 4	The summary contains: a) review of new method b) justification of why it is better than old (using data work) c) includes possible problems that might arise in future with this
<input type="checkbox"/> 3	The summary contains: a) review of new method b) justification of why it is better than old (using data work)
<input type="checkbox"/> 2	The summary contains: a) review of new method b) justification of why it is better than old (using data work) but it is unclear or hard to follow
<input type="checkbox"/> 1	The summary is hard to follow or it leaves out major points of justification.

WORKSHEET 7 FROM HiMAP

Print copies of Worksheet from **The Mathematical Theory of Elections** on the HiMAP CD-ROM for your students. This is intended to be used as a 15-minute test at the end of this module.

You can also find solutions to those worksheets on the CD-ROM.