

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. In a voting system, the number of votes necessary to win the election is called the:
  - A) Victor
  - B) Successor
  - C) Quota
  - D) Coalition
  
2. Suppose there are three delegates to a county convention: Adam has 4 votes from his precinct, Bob has 3 votes, and Cathy has 1 vote. A simple majority wins. Which of the following is not a winning coalition?
  - A) Adam, Bob, and Cathy
  - B) Adam and Bob
  - C) Adam and Cathy
  - D) Bob and Cathy
  
3. For  $n$  voters, there are  $2^n$  possible coalitions.
  - A) True
  - B) False
  
4. In a collection of six voters, how many different permutations are possible?
  - A) 720
  - B) 600
  - C) 128
  - D) 64
  
5. Suppose there are five voters, A, B, C, D, and E, with 7, 6, 5, 4, and 3 votes, respectively. Suppose that a simple majority is required to win. What is the quota?
  - A) 15
  - B) 14
  - C) 13
  - D) 12
  
6. Suppose there are five voters, A, B, C, D, and E, with 7, 6, 5, 4, and 3 votes, respectively. Suppose that a simple majority is required to win. How many coalitions are there?
  - A) 120
  - B) 119
  - C) 32
  - D) 31

7. Suppose there are only two voters. Arnold controls 160 votes and the quota is 145 votes. What is Arnold's Shapley-Shubik index?
- A)  $2/3$   
 B)  $2/2$   
 C)  $1/2$   
 D)  $0/2$
8. In a group of 50 voters, each person has 1 vote, and the quota is a simple majority. What is the Shapley-Shubik index for each voter?
- A)  $1/2$   
 B)  $13/50$   
 C)  $13/25$   
 D)  $1/50$
9. Suppose a country consists of 35 states, each of which is assigned a certain number of electoral votes. How many vote orders would we need to consider in order to calculate the Shapley-Shubik index for each state?
- A)  $2^{35}$   
 B)  $2^{35} - 1$   
 C)  $35!$   
 D)  $35! - 1$
10. Suppose that there are only three hypothetical states with a distribution of popular and electoral votes as shown in the table below. Find the Shapley-Shubik index for state A using the electoral vote. Assume that a simple majority is required.

	State A	State B	State C	Total
Population	200	300	500	1000
Senators	2	2	2	6
Representatives	2	3	4	9
Electoral votes	4	5	6	15

- A)  $1/6$   
 B)  $1/3$   
 C)  $2/3$   
 D)  $5/6$

Use the following to answer questions 11-14:

Suppose there are three delegates to a county convention: Adam has 14 votes from his precinct, Bob has 13 votes, and Cathy has 11 votes. A simple majority wins.

11. Make a table listing all of the coalitions and the critical voter in each case.
12. Find the Banzhaf index for each voter.
13. Make a table listing all of the permutations and the swing voter in each case.
14. Find the Shapley-Shubik index for each voter.