1. Suppose a small country has four states with the following populations:

State	Adams	Lincoln	Madison	Washington
Population	673	70	155	770

The legislature is apportioning seats to each of the four states. First, use Hamilton's Method to apportion 100 seats to each state according to their respective populations. Then, again using Hamilton's Method, apportion 101 seats to each state according to their respective populations.

Did the Alabama Paradox occur?

A. No.

B. Yes.

2. Suppose California, Washington, British Columbia, and Oregon have formed their own union called Pacifica. Pacifica's legislature is apportioning 101 seats in the House of Representatives. The apportionment will be based upon each state/province's population: California 39.56 million, Washington 7.536 million, British Columbia 4.992 million, and Oregon 4.191 million.

Apportion these 101 seats using Webster's Method.

A. CA: 71 seats, WA: 13 seats, BC: 9 seats, OR: 8 seats.

B. CA: 73 seats, WA: 11 seats, BC: 7 seats, OR: 10 seats.

C. CA: 69 seats, WA: 15 seats, BC: 8 seats, OR: 9 seats.

D. CA: 70 seats, WA: 14 seats, BC: 8 seats, OR: 9 seats.

E. CA: 71 seats, WA: 13 seats, BC: 7 seats, OR: 10 seats.

F. CA: 73 seats, WA: 11 seats, BC: 9 seats, OR: 8 seats.

G. CA: 69 seats, WA: 15 seats, BC: 7 seats, OR: 10 seats.

H. CA: 70 seats, WA: 14 seats, BC: 9 seats, OR: 8 seats.

3. True or False: Hamilton's Method is immune to violations of the Quota Rule.

A. True

B. False

4. True or False: Lowndes' Method is immune to paradoxes and violating the Quota Rule.

A. True

B. False

5. The Oregon Trucking Company has just purchased a fleet of 113 new trucks to be apportioned to its 5 distribution centers located around the state. These 5 centers and their average monthly volume of freight measured in number of truckloads is given below:

Distribution Center	Portland	Eugene	Medford	Bend	La Grande
Freight Volume	969	361	68	65	59

Apportion these 113 trucks to each distribution center using Jefferson's Method.

A. Portland: 73, Eugene: 26, Medford: 6, Bend: 4, La Grande: 4.

B. Portland: 72, Eugene: 28, Medford: 4, Bend: 5, La Grande: 4.

C. Portland: 73, Eugene: 27, Medford: 5, Bend: 4, La Grande: 4.

D. Portland: 72, Eugene: 27, Medford: 5, Bend: 5, La Grande: 4.

E. Portland: 72, Eugene: 26, Medford: 6, Bend: 5, La Grande: 4.

F. Portland: 73, Eugene: 25, Medford: 7, Bend: 4, La Grande: 4.

G. Portland: 75, Eugene: 25, Medford: 7, Bend: 2, La Grande: 4.

H. Portland: 75, Eugene: 28, Medford: 4, Bend: 2, La Grande: 4.

6. In the U.S., the Electoral College is used in presidential elections. Each state is awarded a number of electors equal to the number of representatives (based on population) and senators (2 per state) they have in congress. Since most states award the winner of the popular vote in their state all their states electoral votes, the Electoral College acts as a weighted voting system. To explore how the Electoral College works, we'll look at a fictional country with 4 states.

Suppose Vermont, Tennessee, Nevada, and Louisiana have formed their own union called the "The Disparate States of America," or the DSA. The DSA has retained the same electoral college system for electing their president and thus, has retained the same number of electoral votes as before: Vermont 3, Tennessee 11, Nevada 6, and Louisiana 8. To win the presidency, a candidate must receive at least 15 electoral votes.

Find the Banzhaf Power Index of each state in the DSA. (Use percentages to express each state's power.)

A. $VT = 8.33\%$, $TN = 25\%$, $NV = 41.67\%$, $LA = 41.67\%$

B. $VT = 8.33\%$, $TN = 41.67\%$, $NV = 25\%$, $LA = 25\%$

C. $VT = 12.5\%$, $TN = 45.83\%$, $NV = 20.83\%$, $LA = 20.83\%$

D. $VT = 8.33\%$, $TN = 45.83\%$, $NV = 41.67\%$, $LA = 20.83\%$

E. $VT = 4.17\%$, $TN = 41.67\%$, $NV = 29.17\%$, $LA = 25\%$

F. $VT = 8.33\%$, $TN = 25\%$, $NV = 25\%$, $LA = 41.67\%$

7. Consider the following weighted voting system $[30 : 15, 11, 10, 8]$. Which of the following is true about Player 1?

A. Player 1 is a dummy.

B. Player 1 has veto power.

C. Player 1 is a dictator.

8. In the U.S., the Electoral College is used in presidential elections. Each state is awarded a number of electors equal to the number of representatives (based on population) and senators (2 per state) they have in congress. Since most states award the winner of the popular vote in their state all their states electoral votes, the Electoral College acts as a weighted voting system. To explore how the Electoral College works, we'll look at a fictional country with 4 states.

Suppose Delaware, Hawaii, South Dakota, and Nebraska have formed their own union called the "The Disparate States of America," or the DSA. The DSA has retained the same electoral college system for electing their president and thus, has retained the same number of electoral votes as before: Delaware 3, Hawaii 3, South Dakota 3, and Nebraska 5. To win the presidency, a candidate must receive at least 8 electoral votes.

Find the Shapley-Shubik Power Index of each state in the DSA. (Use reduced fractions to express each state's power.)

A. $DE = \frac{3}{16}$, $HI = \frac{3}{16}$, $SD = \frac{7}{48}$, $NE = \frac{23}{48}$

B. $DE = \frac{1}{6}$, $HI = \frac{1}{6}$, $SD = \frac{1}{6}$, $NE = \frac{1}{2}$

C. $DE = \frac{1}{8}$, $HI = \frac{1}{6}$, $SD = \frac{5}{24}$, $NE = \frac{1}{2}$

D. $DE = \frac{1}{4}$, $HI = \frac{1}{4}$, $SD = \frac{1}{12}$, $NE = \frac{5}{12}$

E. $DE = \frac{3}{16}$, $HI = \frac{1}{4}$, $SD = \frac{7}{48}$, $NE = \frac{5}{12}$

F. $DE = \frac{1}{6}$, $HI = \frac{3}{16}$, $SD = \frac{1}{6}$, $NE = \frac{23}{48}$

9. Find the Banzhaf Power Index of the weighted voting system $[29 : 10, 4, 15, 7]$. (Use reduced fractions to express each player's power.)

A. $P_1 = \frac{7}{16}$, $P_2 = \frac{3}{16}$, $P_3 = \frac{5}{16}$, $P_4 = \frac{1}{16}$

B. $P_1 = \frac{3}{8}$, $P_2 = \frac{3}{8}$, $P_3 = \frac{1}{8}$, $P_4 = \frac{1}{8}$

C. $P_1 = \frac{3}{8}$, $P_2 = \frac{1}{8}$, $P_3 = \frac{3}{8}$, $P_4 = \frac{1}{8}$

D. $P_1 = \frac{7}{16}$, $P_2 = 0$, $P_3 = \frac{1}{2}$, $P_4 = \frac{1}{16}$

E. $P_1 = \frac{1}{4}$, $P_2 = 0$, $P_3 = \frac{1}{2}$, $P_4 = \frac{1}{4}$

F. $P_1 = \frac{1}{4}$, $P_2 = \frac{1}{8}$, $P_3 = \frac{3}{8}$, $P_4 = \frac{1}{4}$

10. Suppose Washington, British Columbia, and Oregon have formed their own union called Cascadia. Cascadia's House of Representatives awards one seat for every million people: Washington 8, British Columbia 5, and Oregon 4. For a bill to become law, it must receive at least 12 votes.

Use the Banzhaf Power Index to measure each states/province's power in the Cascadian House of Representatives. (Use percentages to express power.)

A. $WA = 60\%$, $BC = 20\%$, $OR = 20\%$

B. $WA = 50\%$, $BC = 10\%$, $OR = 40\%$

C. $WA = 70\%$, $BC = 10\%$, $OR = 20\%$

D. $WA = 50\%$, $BC = 20\%$, $OR = 30\%$

E. $WA = 40\%$, $BC = 20\%$, $OR = 40\%$

F. $WA = 60\%$, $BC = 10\%$, $OR = 30\%$

Answers

1. A.
2. A.
3. A.
4. B.
5. C.
6. B.
7. B.
8. D.
9. C.
10. A.