

1) The matrix below shows the number of hours it takes to complete different jobs.

	Airport	Highway	Parking Lot
Surveying Crew	$\left[\begin{array}{ccc} 200 & 150 & 50 \\ 300 & 500 & 75 \\ 550 & 375 & 100 \\ 35 & 50 & 40 \end{array} \right]$		
Grading Crew			
Paving Crew			
Paint Crew			

The contractor is currently working on 2 airports, 4 highways, and 12 parking lots. Which statement is **NOT** true?

- (a) There are more hours spent by the paint crew highways than parking lots.
- (b) The paving crew will spend less time on both the airports and highways than they will spend on the parking lots.
- (c) The surveying crew will spend the same number of hours on the highways and the parking lots.
- (d) The grading crews spends less time on the airports than the parking lots.

2) Find the value of x.

$$\begin{bmatrix} 2-x & 8 \\ 9 & 6 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} -5 & 10 \\ 14 & 3 \end{bmatrix}$$

- (a) 6
- (b) 14
- (c) 8
- (d) -7

3) Given the following matrices, which one does not have an inverse and why?

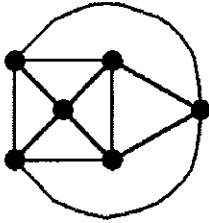
$$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} -6 & -2 \\ -5 & -1 \end{bmatrix}$$

$$C = \begin{bmatrix} 3 & 6 \\ 2 & 4 \end{bmatrix}$$

- (a) Matrix A does not have an inverse because it is the identity matrix.
- (b) Matrix B does not have an inverse because all its elements are negative.
- (c) Matrix C does not have an inverse because its determinant is zero.
- (d) All of the matrices have inverses because they are all square.

4) The graph below shows the relationship between various locations. Can an Euler circuit be drawn?

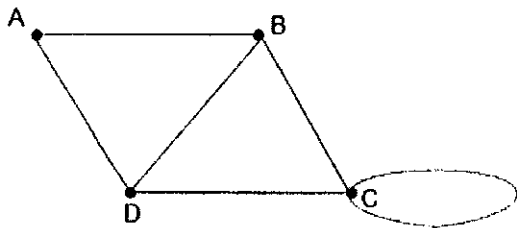


- (a) No, because there are exactly 2 vertices with an odd degree.
- (b) No, because each vertex is of an even degree.
- (c) Yes, because there are exactly 3 vertices with an odd degree.
- (d) Yes, because each vertex is of an even degree.

5) Is the graph in problem 4 a complete graph?

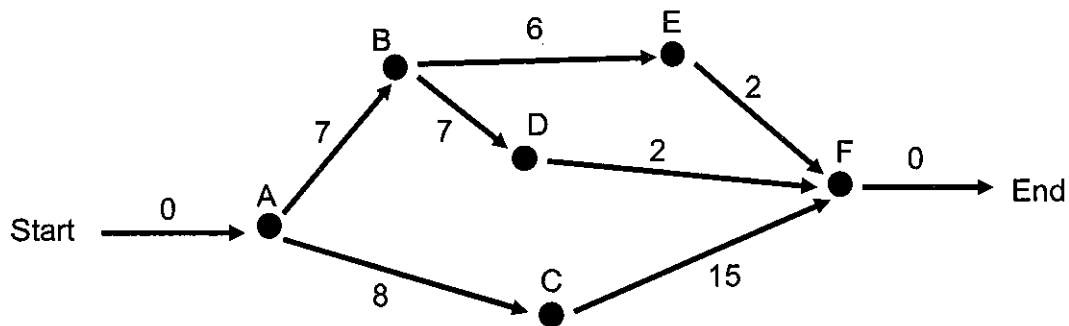
- (a) Yes, each vertex is one degree less than the total number of vertices and there are no loops or parallel edges.
- (b) Yes, each vertex has at least one edge and there are no loops or parallel edges.
- (c) No, there is at least one bridge, loop, or parallel edges.
- (d) No, not all the vertices connect to each other.

6) Name the degree of each vertex.



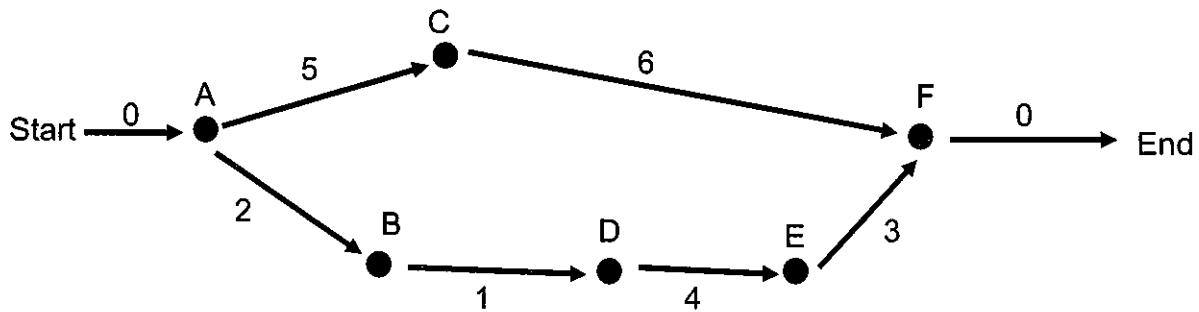
- (a) $\text{deg}(A) = 1, \text{deg}(B) = 3, \text{deg}(C) = 2, \text{deg}(D) = 3$
- (b) $\text{deg}(A) = 2, \text{deg}(B) = 3, \text{deg}(C) = 2, \text{deg}(D) = 3$
- (c) $\text{deg}(A) = 1, \text{deg}(B) = 3, \text{deg}(C) = 4, \text{deg}(D) = 3$
- (d) $\text{deg}(A) = 2, \text{deg}(B) = 3, \text{deg}(C) = 4, \text{deg}(D) = 3$

7) What is the critical path for the diagram below?



- (a) Start- A-B-D-F- End
- (b) Start- A-B-E-F- End
- (c) Start- A-C-F- End
- (d) Start- A-B-C-D-E-F- End

8) What is the critical path for the diagram below?



- (a) Start- A- B- C- End
- (b) Start- A- C- F- End
- (c) Start- A- B- D- E- F- End
- (d) Start- A- C- D- E- F- End

9) A class needs to complete the task list below for a project.

Task	Time	Prerequisites
Start	0 minutes	--
A	7 minutes	--
B	6 minutes	--
C	5 minutes	A
D	4 minutes	B
E	10 minutes	C
F	7 minutes	D
G	3 minutes	F

If there are two students working on completing tasks, what is the minimum amount of time it will take the class to complete the task list?

- (a) 20 minutes
- (b) 22 minutes
- (c) 32 minutes
- (d) 42 minutes

10) If you have a jar full of red and green marbles, which method would be the best way to take a random sample?

- (a) Close your eyes and take out a marble one at a time until you get to 20.
- (b) Make two piles, one red and one green, and count how many marbles there are of each color.
- (c) Take half the marbles out and then count how many were red.
- (d) Close your eyes and take out a marble one at a time until you take all of the marbles out.

11) If you have a jar full of red and green marbles, which method would be the best way to take a census?

- (a) Close your eyes and take out a marble one at a time until you get to 20.
- (b) Make two piles, one red and one green, and count how many marbles there are of each color.
- (c) Take half the marbles out and then count how many were red.
- (d) Close your eyes and take out a marble one at a time until you take all of the marbles out.

12) When selecting the MVP of the high school football team, which method would eliminate any bias?

- (a) Have each football player vote.
- (b) Have everyone who attends the last home football game vote.
- (c) Have the P.E. classes vote.
- (d) Have the entire student body vote.

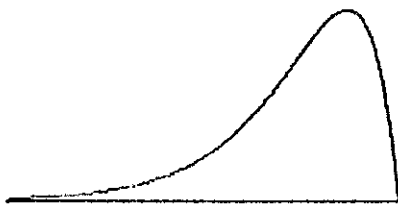
13) The class average on the state test is a 75%, the standard deviation is 4 points. Considering that the scores are normally distributed, what percentage of students should score between 67% and 83%

- (a) 16%
- (b) 68%
- (c) 95%
- (d) It can't be determined

14) There are 500 students enrolled in Economics courses at a college. The average grade in these classes is an 82% with a standard deviation of 5. If the scores are normally distributed, how many students would be expected to score between an 82% and an 87%?

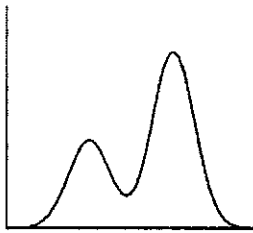
- (a) 25
- (b) 34
- (c) 170
- (d) 250

15) Which **best** describes the distribution of the data?



- (a) skewed right
- (b) skewed left
- (c) symmetric
- (d) bimodal

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- (a) skewed right
- (b) skewed left
- (c) symmetric
- (d) bimodal

17) A stem-and-leaf plot is shown below.

Stem	Leaves
1	1, 2, 3, 5
2	2, 4, 6, 8, 9, 9
3	2, 4, 5, 7, 8
4	0, 1, 4, 8, 9
5	1, 3, 3, 3, 6, 8, 9

What is the mean of the data?

- (a) 29
- (b) 36.67
- (c) 37
- (d) 53

18) A stem-and-leaf plot is shown below.

Stem	Leaves
3	1, 2, 3
4	2, 8, 9, 9
5	2, 7, 8
6	3, 4, 7

What is the median of the data?

- (a) 33
- (b) 49
- (c) 57
- (d) 67

19) A spinner is divided into 5 equal sections that are equally likely to occur. The sections are number 1 through 5. Samantha will spin the spinner 4 times. What is the probability that the spinner will land on an even number exactly 1 out of the 4 times?

- (a) 34.6%
- (b) 16%
- (c) 12%
- (d) 25.6%

20) When rolling a die 100 times, what is the probability of rolling a "4" exactly 25 times?

- (a) 1%
- (b) 3.5%
- (c) 10%
- (d) 16.7%

21) A diner offers your choice of entrée: meatloaf, roast beef, or turkey, your choice of side: mashed potatoes, green beans, carrots, or corn, and your choice of roll or a biscuit. How many different combinations of meals can you order?

- (a) 9 (b) 12 (c) 18 (d) 24

22) A photograph is selecting a group of students to pose for the cover of the yearbook. Volunteers for the photo arrive and there are 8 seniors, 7 juniors, and 10 sophomores. The photographer only needs 4 students from each grade level. How many ways can the photograph choose 12 students for the photo? Note: It doesn't matter how the students are arranged in the photo.

- (a) 315 (b) 7,112,448,000 (c) 514,500 (d) 560

23) How many different ways can you arrange 8 books on a shelf if you have 15 books in a pile to choose from?

- (a) 120 (b) 6,435 (c) 259,459,200 (d) 163,459,296

24) A ballot contains a list of 4 candidates. Each voter can choose between 2 to 4 candidates. In how many ways can a voter complete the ballot?

- (a) 9 (b) 11 (c) 16 (d) 24

25) What number of votes would declare the winner by majority if 240 people voted?

- (a) 80 (b) 100 (c) 120 (d) 140

26) There is a 50% chance of a fair coin landing on tails. What is the **approximate** probability that a coin will land on tails at least 4 times if it is tossed 6 times.

- (a) 0.23 (b) 0.34 (c) 0.65 (d) 0.89

27) The high school basketball team has a probability of $\frac{2}{5}$ of winning each of their games. If they must win exactly 6 games out of 10 to be in the playoffs, what is the **approximate** probability that they will make the playoffs?

- (a) 4% (b) 8% (c) 11% (d) 17%

28) Fifteen people ranked their favorite pizza restaurant. The table below shows the preference schedule for the four pizza restaurants.

	10 votes	6 votes	8 votes	5 votes
1 st choice	Dominos	Little Caesars	Pizza Hut	Little Caesars
2 nd choice	Pizza Hut	Dominos	Little Caesars	Papa Johns
3 rd choice	Little Caesars	Papa Johns	Papa Johns	Dominos
4 th choice	Papa Johns	Pizza Hut	Dominos	Pizza Hut

The winner of the election will be determined by Plurality. Which pizza restaurant is the most preferred with this method?

- (a) Dominos (b) Little Caesars (c) Papa Johns (d) Pizza Hut

29) The following preference schedule shows which brand of shoes that Ms. Haywood's class prefers. If Nike went out of business which brand would be the most preferred by the class?

	15 votes	11 votes	8 votes	4 votes
1 st choice	Nike	Vans	Toms	Toms
2 nd choice	Vans	Nike	Sketchers	Sketchers
3 rd choice	Toms	Sketchers	Vans	Nike
4 th choice	Sketchers	Toms	Nike	Vans

- (a) Sketchers (b) Toms (c) Vans (d) Tie

30) A board of commissioners has 5 members. The board uses a weighted voting system to make decisions. At least 10 votes are needed to pass a motion. The weight of each board member's vote is listed below.

6, 4, 3, 2, 2

How many different winning coalitions are there?

- (a) 288 (b) 120 (c) 15 (d) 7

31) A series is shown below.

$$\sum_{n=1}^{\infty} 2 \cdot \frac{1^n}{3}$$

- (a) The series converges to 3. (b) The series converges to -1.
 (c) The series diverges. (d) Cannot be determined.

32) The only Arithmetic sequences that converges is...

- (a) -1, 1, -1, 1, -1, ... (b) 1, 1, 2, 3, 5, ...
 (c) 0, 0, 0, 0, 0, ... (d) 1, 2, 3, 4, 5, ...