

Math 114

Practice Final

- 1) Which of the following is not statement?
 - a) Please stop snapping your fingers.
 - b) John wouldn't stop snapping his fingers.
 - c) Snapping your fingers is irritating.
 - d) I can snap my fingers.

Solution: a) Please stop snapping your fingers.

- 2) Which of the following is the negation of "All equations have solutions"?
 - a) Some equations do not have solutions.
 - b) No equation has a solution.
 - c) Some equations have solutions.
 - d) Some things that have solution are not equations.

Solution: a) Some equations do not have solutions.

- 3) Consider the following argument.

John went to the store and Charlotte went the room with the yellow wallpaper.

John did not go to the store.

Therefore, Charlotte did not go to the room with the yellow wallpaper.

- a) deductive reasoning
- b) inductive reasoning

Solution: a) deductive reasoning

- 4) Let $p =$ "John has a dollar bill" and $q =$ "Jane has a dollar bill" Which of the following is symbolized by $p \vee \sim q$.

- a) Either John has a dollar or Jane does not have a dollar
- b) It is not true that John has a dollar and Jane has a dollar.
- c) Either John does not have a dollar, or Jane does have a dollar.
- d) John has a dollar, but Jane does not.

Solution: a) Either John has a dollar or Jane does not have a dollar

5) Which of the following is the negation of “My car is red and your car is blue”

- a) My car isn't red and your car isn't blue
- b) My car is red, but your car isn't blue.
- c) Either my car isn't red or your car isn't blue.
- d) If my car isn't red, then your car isn't blue.

Solution: c) Either my car isn't red or your car isn't blue.

6) Which of the following is the negation of “Either my door is open or your door is closed”?

- a) My door isn't open, and your door is closed.
- b) If my door is closed, then your door is open.
- c) My door is closed and your door is open.
- d) Either my door is closed or your door open.

Solution: c) My door is closed and your door is open.

7) Which of the statements below is a valid conclusion to the following argument?

No cloud is fluffy.

Fog is a cloud.

- a) No clouds are fog.
- b) Fog is not fluffy.
- c) Some fog is fluffy.
- d) If a cloud is fog, then that cloud is fluffy.

Solution: b

8) In scientific notation, $1623.7 =$

- a) 1.6237×10^2
- b) 0.01637×10^2
- c) 1.6237×10^4
- d) 1.6237×10^3

Solution: d) $1623.7 = 1.6237 \times 10^3$

9) What is the following numbers is the largest?

- a) 0.052349×10^{-2}
- b) 523.49×10^{-3}
- c) 5234.9×10^{-5}
- d) 0.000052349×10^3

Solution: b)

$$0.052349 \times 10^{-2} = .00052349$$

$$523.49 \times 10^{-3} = .52349$$

$$5234.9 \times 10^{-5} = .052349$$

$$0.000052349 \times 10^3 = 0.052349$$

10) Which of the following is not well-defined?

- a) $\{x \mid x \text{ is a } \textit{LARGE} \text{ dog}\}$
- b) $\{x \mid x \text{ is dog weighing more than 80 pounds}\}$
- c) $\{x \mid x \text{ is a dog at least 27 inches tall}\}$
- d) $\{x \mid x \text{ is a dog}\}$

Solution: a) $\{x \mid x \text{ is a } \textit{LARGE} \text{ dog}\}$

11) Let $A = \{1,2,3,4\}$. Which of the following is not a proper subset of A?

- a) $\{1,3,4\}$
- b) \emptyset
- c) $\{1,2,3,4\}$
- d) $\{1,2,3\}$

Solution: c $\{1,2,3,4\}$

12) John has eight pens, three pencils, and two rulers. In how different ways can he select a pen, pencil, and ruler to bring to a test?

- a) 13
- b) 48
- c) 24
- d) 12

Solution: b) *possible ways* = $(8)(3)(2) = 24(2) = 48$

13) Of the equations listed below, which has a graph that is a parabola opening up?

- a) $y = 3x - 2$
- b) $y = 2 - 3x^2$
- c) $y = 2 - 3x$
- d) $y = 3x^2 - 2$

Solution: d)

14)

John has been keeping careful track of the amount of lemonade he sells at his lemonade stand, and has determined that if he sees n customers in a day, then he sells $L = 0.28n$ gallons of lemonade that day. What is the meaning of the slope in John's equation?

- a) For each extra customer, John sells 0.28 more gallons of lemonade.
- b) For every 0.28 customers, John sells an extra gallon of lemonade.
- c) John is not selling any lemonade.
- d) The ratio of lemonade to customers is 0.28:1

Solution: a

For each extra customer, John sells 0.28 more gallons of lemonade.

15) The vertex of the parabola $y = 8x - 2x^2$

- a) (2,8)
- b) (2,-8)
- c) (-2,-8)
- d) (-2,4)

$$y = 8x - 2x^2$$

$$a = -2$$

$$b = 8$$

$$x = \frac{-b}{2a} = \frac{-8}{2(-2)} = \frac{-8}{-4} = 2$$

$$y = 8(2) - 2(2)^2 = 16 - 8 = 8$$

(2,8)

Solution: a)

16) Suppose that a kicked football follows a path given by $y = -0.1x^2 + 1.6x$, where x is the distance in feet where the ball is kicked and y is the height of the ball above the ground. What is the maximum height the ball reaches?

- a) 6.4 feet
- b) 8 feet
- c) 64 feet
- d) 1.7 feet

Solution: a)

$$y = -0.1x^2 + 1.6x$$

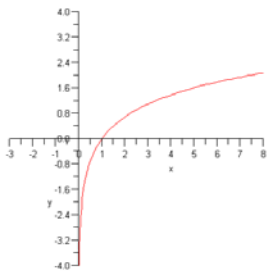
$$a = -0.1$$

$$b = 1.6$$

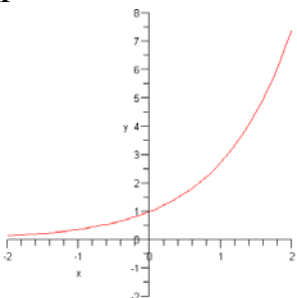
$$x = -\frac{b}{2a} = -\frac{1.6}{2(-0.1)} = -\frac{1.6}{-0.2} = 8$$

$$y = -0.1(8)^2 + 1.6(8) = -6.4 + 12.8 = 6.4 \text{ feet}$$

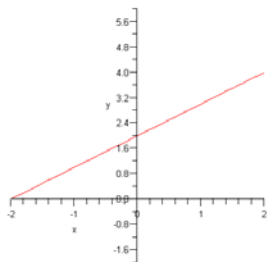
17) Which of the curves below is decreasing exponentially?



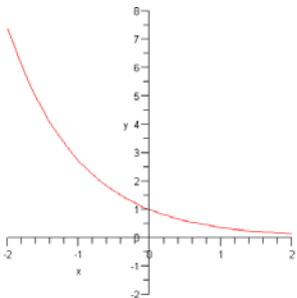
I



II



III



IV

- a) II
- b) IV
- c) I
- d) III

Solution: b) IV

18) Which of the following is equivalent to $5^3 = 125$?

- a) $\log_3 125 = 5$
- b) $\log_{125} 5 = 3$
- c) $\log_5 125 = 3$
- d) $\log_3 5 = 125$

Solution: c

19) The approximate percentage of a boy's height that he has reached a x years is given by $P = 84 + 12\log(x - 2)$ for $12 \leq x \leq 18$. If John is 5'4" at age 14, which of the following answers represents John's adult height?

- a) 5'6"
- b) 5'11"
- c) 6'
- d) 6'1"

$$P = 84 + 12\log(x - 2) = 84 + 12\log(14 - 2) = 84 + 12\log(12) = 84 + 13 = 97\%$$

$$5'4'' = 64 \text{ in}$$

$$\frac{97}{100} = \frac{64}{h}$$

$$97h = 100(64)$$

$$97h = 6400$$

$$h \approx 66 \approx 5'6''$$

Solution: a

20) **Complete the following statement:** The logistic model is useful for modeling

- a) population decreasing because of resource constraints
- b) populations growing without resource constraints
- c) population undergoing catastrophic decline
- d) population growing under resource constraints

Solution: d

21) Last year a certain coat cost \$360, but the price has gone up 15% since then. What is the price now?

- a) \$306.00
- b) \$666.00
- c) \$414.00
- d) \$375.00

$$(.15)(\$360) = \$54.00$$

$$\$360.00 + \$54.00 = \$414.00$$

Solution: c)

22) An item in a store was marked down 25%. If it has a sale price of \$54.54, what was the original price, to the nearest cent?

- a) \$95.45
- b) \$72.72
- c) \$68.18
- d) \$79.54

Solution: b)

$$x = \text{original cost}$$

$$.25x = \text{mark down}$$

$$x - .25x = 54.54$$

$$.75x = 54.54$$

$$\frac{.75x}{.75} = \frac{54.54}{.75}$$

$$x = \$72.72$$

23) Suppose you deposit \$2000 into a saving account paying 3.5% simple annual interest. If you make other deposits or withdrawals, what is the value of the account after five years?

- a) \$2350.00
- b) \$2375.37
- c) \$2381.89
- d) \$2392.52

Solution: a)

$$I = PRT = (\$2000)(.035)(5) = \$350$$

$$\text{Balance} = \$2000 + \$350 = \$2350$$

24) Suppose you buy a \$2500 certificate of deposit paying 3.7 % annual interest compounded annually. To the nearest cent, how much is it worth at the end of four years?

- a) \$2870.00
- b) \$8806.88
- c) \$2891.05
- d) \$2898.12

Solution: c)

$$A = P \left(1 + \frac{r}{n} \right)^{nt} = 2500 \left(1 + \frac{.037}{1} \right)^{1(4)} = 2500(1 + .037)^4 = 2500(1.037)^4 = \$2891.05$$

25) Suppose you deposit \$2000 in an account paying 4.1 % annual interest compounded monthly. If you make no other deposits or withdrawals, what is the value of the account after four years?

- a) \$2348.73
- b) \$2328.00
- c) \$2421.53
- d) \$2355.77

Solution: d

$$A = P \left(1 + \frac{r}{n} \right)^{nt} = 2000 \left(1 + \frac{.041}{12} \right)^{12(4)} = 2000(1 + .0034166667)^{48} = 2000(1.0034166667)^{48} = \$2355.77$$

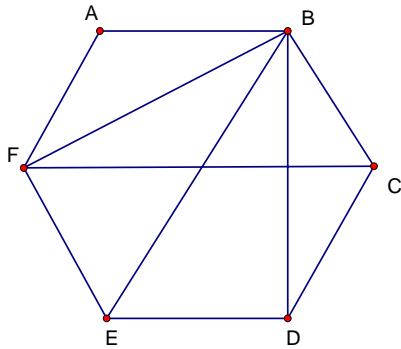
26) Suppose you buy a new car. You must put down \$5000 in cash and finance the remaining \$21,600 with a four year loan at 4.5 % annual interest compounded monthly. To the nearest cent, what will be your monthly payments be?

- a) \$511.27
- b) \$492.56
- c) \$606.57
- d) \$536.63

Solutions: b)

$$PMT = \frac{(\$21,600) \frac{.045}{12}}{1 - \left(1 + \frac{.045}{12} \right)^{-12(4)}} = \frac{(\$21,600) .00375}{1 - (1 + .00375)^{-48}} = \frac{\$81}{1 - (1.00375)^{-48}} = \frac{\$81}{1 - .834887} = \left(\frac{\$81}{.165012} \right) = \$492.56$$

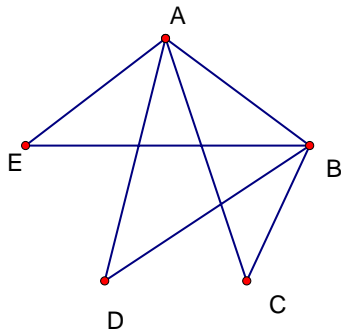
27) What is the degree of the vertex D in the graph shown?



- a. 4
- b. 5
- c. 2
- d. 3

Solution d) (Since there is three edges connected to D, vertex D is degree 3.)

28) Which of the following is an Euler Circuit in the graph shown?

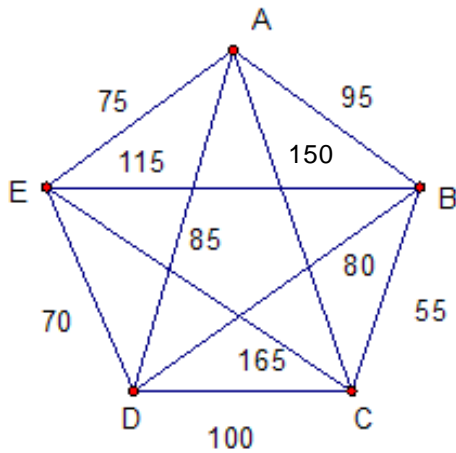


- a) CADEBEA
- b) ABCADBCA
- c) EADBCA
- d) BCAEBDAB

Solution: d

If following the pattern given by BCAEBDAB, you will visit every edge without tracing over any edge twice.

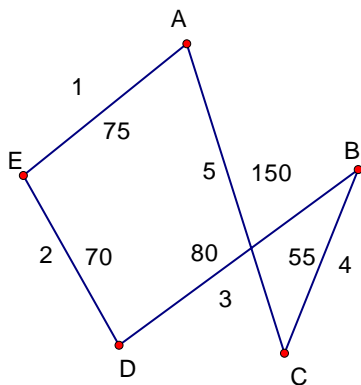
Diagram for 29



29) The graph shows the mileage between various towns labeled A,B,C,D, and E. Tom, who lives in A, wishes to visit all the towns exactly once and the return home. If the sorted –edge (nearest neighbor) algorithm is used to determine an approximate solution for his best route, what is the total distance along that route?

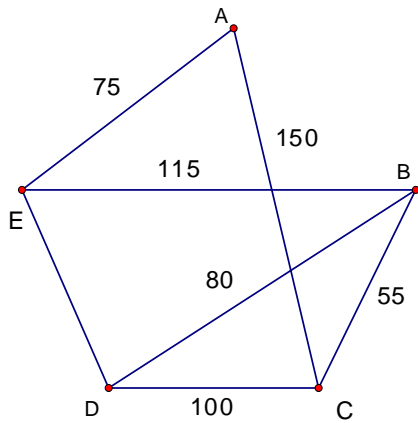
- a) 375
- b) 410
- c) 435
- d) 430

Solution: d)



$$d = 75 + 70 + 80 + 55 + 150 = 430 \text{ miles}$$

30)

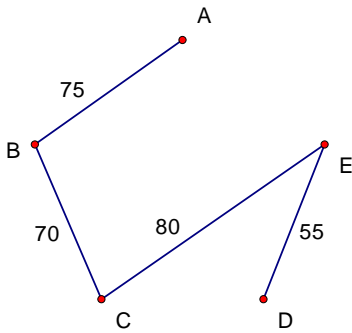


In the weighted graph shown, what is the total weight of a minimum spanning tree?

- a) 645
- b) 320
- c) 280
- d) 520

Solution c)

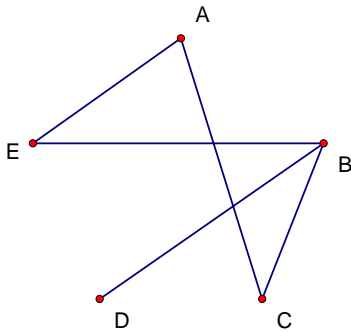
Minimum spanning tree



$$\text{Total distance} = 70+75+80+55 = 280$$

31) Which edge can be removed from the graph to form a tree?

- a) CE
- b) DB
- c) BC
- d) BD



Solution: c)

If DB or BD is removed from the graph it is no longer a tree.
Edge CE does not exist. BC can be removed and the graph is still a tree.
Therefore, the answer is BC

32) Xavier, Yvonne, and Zenobia are running in an election in which voting method is plurality. If Xavier gets 165 votes and Yvonne gets 414 votes, how many votes does Zenobia need to win?

- a) 415
- b) 580
- c) 166
- d) Zenobia cannot win this election

Solution: 415 votes will win the plurality vote (a)

33) A club with ten members used a Borda count to elect its president this year. Rankings were as follows.

How many points did candidate A receive?

Member	1	2	3	4	5	6	7	8	9	10
Ranking	ACB	BCA	CBA	BCA	CBA	ACB	BCA	CBA	BAC	ACB

- a) 3
- b) 22
- c) 17
- d) 8

Solution: c

First place votes for A: 3

Second place votes for A: 1

Third place votes for A: 6

Total points: $3(3)+1(2)+6(1) = 9+2+6 = 17$

34) Which of the following describes the Condorcet Criterion of social choice theory?

- a) A candidate who wins a first election and gains additional support (without losing any of his original support) should win a second election.
- b) If candidate A wins a first election, then some candidates are removed and a second election is held, then candidate A should win the second election.
- c) If a candidate is favored when compared one-to-one with every other candidate, then that candidate should win.
- d) If a candidate receives a majority of the votes, that candidate should win.

Solution: c

35) A majority-rule election with four candidates gave the following results.

Ranking	ABCD	BACD	BCDA	CADB	CDBA	DBCA
Voters	32	19	26	23	32	45

Who one?

- a) D
- b) C
- c) A
- d) B
- e) None of the above

Solution: not listed

Majority rule: $n = 177$, $majority = \frac{177 + 1}{2} = \frac{178}{2} = 89 \text{ votes}$

First Place Votes

$A : 32$

$B : 19 + 26 = 45$

$C : 23 + 32 = 55$

$D : 45$