

Math 116
Practice Final Solutions

1) Write the prime factorization of 250 in conical form.

- a) $2 \cdot 3^3 5$
- b) $2 \cdot 5^3$
- c) $2 \cdot 3 \cdot 4 \cdot 5$
- d) $2^3 3 \cdot 5^2$

Solution: b)

$$250$$

$$25 \cdot 10$$

$$5 \cdot 5 \cdot 5 \cdot 2$$

2) Convert the following binary (base two) number to a base ten number.

$$1000110_2$$

- a) 54
- b) 63
- c) 70
- d) 86

Solution: c

$$1 \cdot 2^6 + 0 \cdot 2^5 + 0 \cdot 2^4 + 0 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^1 + 0 \cdot 2^0$$

$$64 + 0 + 0 + 0 + 4 + 2 + 0$$

$$70$$

3) Convert 220 to a binary number.

- a) 1111000_2
- b) 1101110_2
- c) 11100100_2
- d) 11100_2

Solution:

$$220 = 128 + 92$$

$$220 = 2^7 + 64 + 28$$

$$220 = 2^7 + 2^6 + 16 + 12$$

$$220 = 2^7 + 2^6 + 2^4 + 8 + 6$$

$$220 = 2^7 + 2^6 + 2^4 + 2^3 + 4 + 2$$

$$220 = 2^7 + 2^6 + 2^4 + 2^3 + 2^2 + 2^1$$

answer : 1101110_2

4) Which of the following is a prime number?

a) 230

b) 91

c) 125

d) 157

Solution: d

5) Chose the number that is rational.

a) π

b) e

c) $\sqrt{2}$

d) $\sqrt{36}$

Solution; d

6) Chose the number that is irrational.

a) $\frac{1}{5}$

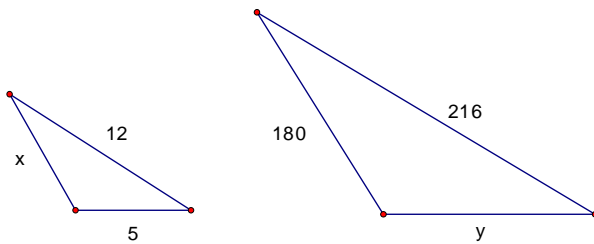
b) $\sqrt{64}$

c) $\sqrt{3}$

d) $\frac{6}{10}$

Solution: c

7) The triangles below are similar. Find x and y .



- a) $x = 10, y = 90$
- b) $x = 10, y = 60$
- c) $x = 20, y = 65$
- d) $x = 15, y = 80$

$$\frac{x}{12} = \frac{180}{216}$$
$$216x = 12(180)$$
$$216x = 2160$$
$$\frac{216x}{216} = \frac{2160}{216}$$
$$x = 10$$

$$\frac{5}{12} = \frac{y}{216}$$
$$12y = 5(216)$$
$$12y = 1080$$
$$\frac{12y}{12} = \frac{1080}{12}$$
$$y = 90$$

8) Which of the following sets is not well defined?

- a) The set of all five senses
- b) The set of all my classes this semester
- c) The set of all skillful musicians
- d) The set of all colors in the rainbow

Solution: c

- 9) Which of the following is a proper subset of the set $\{a, b, c, d\}$
- a) $\{a, c, e\}$
 - b) $\{a, b, c, f\}$
 - c) $\{d, a, b, c\}$
 - d) $\{a, c, d\}$

Solution: d

- 10) Suppose the two shorter sides of a triangle have lengths of a and b and the longest side has a length of c . Which of the following values for a , b , and c would result in a right triangle?
- a) $a = 12, b = 13, c = 14$
 - b) $a = 7, b = 9, c = 11$
 - c) $a = 3, b = 4, c = 5$
 - d) $a = 17, b = 34, c = 40$

$$c^2 = a^2 + b^2$$

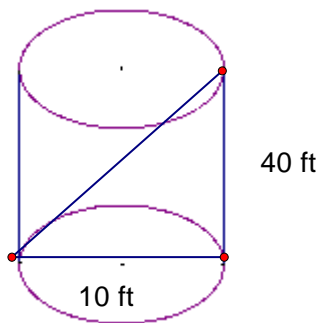
$$5^2 = 3^2 + 4^2$$

$$25 = 9 + 16$$

$$25 = 25$$

- 11) A cylinder is 40 inches long and has a radius of 5 inches. What is the length of the longest rigid object that will fit inside the cylinder?
- a) 30
 - b) 34.7
 - c) 41.2
 - d) 51.2

Solution:



$$c^2 = a^2 + b^2$$

$$c^2 = 10^2 + 40^2$$

$$c^2 = 100 + 1600$$

$$c^2 = 1700$$

$$\sqrt{c^2} = \sqrt{1700}$$

$$c = 41.2$$

12) Let $U = \{a, c, e, g, i, k, m, o\}$ be the universal set and let $A = \{c, e, g, i, k\}$ and let $B = \{c, e, g, m, o\}$. What is the complement of $A \cap B$?

- a) $\{a\}$
- b) $\{a, i, k, o\}$
- c) $\{a, i, o\}$
- d) \emptyset

13) Which of the following is a statement?

- a) Many times I get tired after running.
- b) Are we there yet?
- c) Blue sky with a yellow sun.
- d) Go to the library and study hard.

14) Which table represents the last column of a truth table for $p \wedge (p \rightarrow \sim q)$

a)

$p \wedge (p \rightarrow \sim q)$
F
T
F
T

b)

$p \wedge (p \rightarrow \sim q)$
F
T
T
T

c)

Solution: c

p	q	$\sim q$	$p \rightarrow \sim q$	$p \wedge (p \rightarrow \sim q)$
T	T	F	F	F
T	F	T	T	T
F	T	F	T	F
F	F	T	T	F

15) Which of the following is a tautology?

- a) $p \wedge \sim p$
- b) $p \rightarrow (p \vee q)$
- c) $(p \wedge q) \rightarrow (p \vee q)$
- d) Both b and c

Solution: d

a)

p	$\sim p$	$p \wedge \sim p$
T	F	F
F	T	F

$p \wedge \sim p$ **is not a tautology**

b)

p	q	$p \vee q$	$p \rightarrow p \vee q$
T	T	T	T
T	F	T	T
F	T	T	T
F	F	F	T

$p \rightarrow p \vee q$ **is a tautology**

c)

p	q	$(p \wedge q)$	$p \vee q$	$(p \wedge q) \rightarrow (p \vee q)$
T	T	T	T	T
T	F	F	T	T
F	T	F	T	T
F	F	F	F	T

$(p \wedge q) \rightarrow (p \vee q)$ **is a tautology**

16) Bill sells IPODS, and he has found that if he sells 20 in a month then his monthly expenses are \$1000 and if he sells 50 in a month then his monthly expenses are \$1260. What is the linear equation that represents his expenses? Let E represent his monthly expenses and let X represent the number of IPODS sold in a month.

- a) $E = 8.67X$
- b) $E = 50X + 1000$
- c) $E = 8.67X + 826.6$
- d) $E = 8.67X - 1260$

Solution: c

$$\text{Find the slope: } m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1260 - 1000}{50 - 20} = \frac{260}{30} = 8.67$$

The equation :

$$y = mx + b$$

$$1000 = 8.67(20) + b$$

$$1000 = 173.4 + b$$

$$1000 - 173.4 = 173.4 - 173.4 + b$$

$$b = 826.6$$

$$E = 8.67X + 826.6$$

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

Solution: d

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

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

Solution: b

19) What type of reasoning is used in the following syllogism?

All chess players are great philosophers.

Rachel is a chess player

Therefore, Rachel is a great philosopher.

- a) inductive reasoning
- b) deductive reasoning
- c) None of the above

Solution: b

20) An initial population of 24 pond lilies is spreading over the pond at a rate of 10% per month. How many pond lilies will there be at the end of the summer in 4 months?

Use the population growth equation, $P = P_0 e^{rt}$

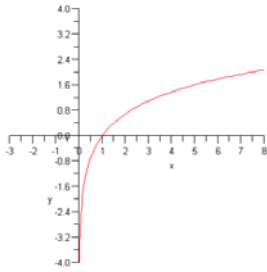
- a) 30
- b) 36
- c) 45
- d) 60

$$P = P_0 e^{rt} = 24e^{.10(4)} = 24e^4 = 35.8 \text{ or } 36 \text{ pond lilies}$$

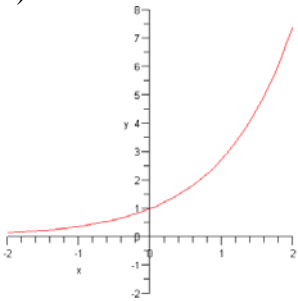
Solution: b

21) Which of the curves below is increasing exponentially?

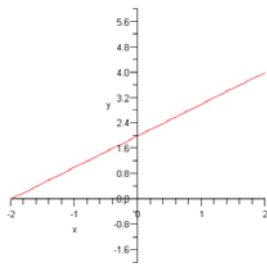
a)



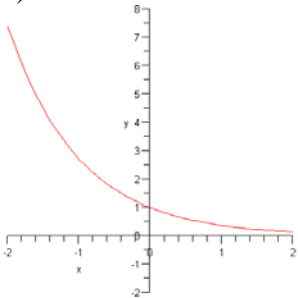
b)



c)



d)



Solution: b)

22) A ball is kicked from the top of a 30 foot platform and its height h is feet after t seconds from the moment it is kicked is modeled by the function $h = -16t^2 + 32t + 30$. What is the maximum height above the ground reached by the ball?

- a) 32 ft
- b) 40 ft
- c) 46 ft
- d) 78 ft

Solution c) 46 ft

$$y = -16t^2 + 32t + 30$$

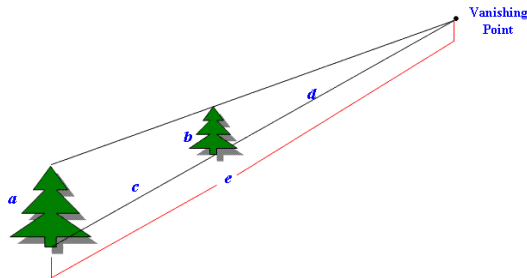
$$a = -16$$

$$b = 32$$

$$x = -\frac{b}{2a} = \frac{-32}{2(-16)} = \frac{-32}{-32} = 1$$

$$h = -16(1)^2 + 32(1) + 30 = -16 + 32 + 30 = 46 \text{ feet}$$

23) Suppose a series of trees of the same size are a part of a one-point perspective drawing. The letters a , b , c , d , and e represents heights or distances given by the following figure



If $a = 50$ ft, $b = 40$ ft, and $e = 110$ ft, find d .

- a) 60 ft
- b) 45 ft
- c) 88 ft
- d) 102 ft

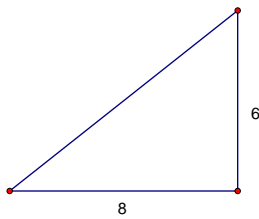
Solution c

$$\frac{50}{110} = \frac{40}{d}$$

$$50d = 4400$$

$$d = 88 \text{ ft}$$

24) If a carpenter wants to make sure that a corner of a room is square and measures out 6 ft and 8 ft along the walls. How long should he make the diagonal?



- a) 12 ft
- b) 14 ft
- c) 10 ft
- d) 9 ft

Solution: c

$$c^2 = 6^2 + 8^2$$

$$c^2 = 36 + 64$$

$$c^2 = 100$$

$$c = 10$$

25) Which of the following can be modeled by Fractal Geometry?

- a) The aerodynamics of an airplane.
- b) Cellular phone antennas
- c) Projectile motion
- d) None of the above

Solution: b)

26) Which of the following is NOT a statement?

- a) David Letterman comes on at 11:30
- b) Welcome to the friendly confines of Wrigley Field
- c) All triangles have a right angle.
- d) $3+4=7$

Solution: b)

27) A salesperson is paid \$100 plus \$60 per sale each week. The model $S = 60x + 100$ is used to calculate the salesperson's weekly salary where x is the number of sales per week. Use the model to calculate the salesperson's weekly salary if he/she makes 20 sales.

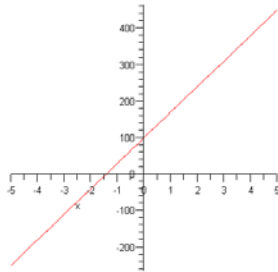
- a) \$1200.00
- b) \$1300.00
- c) \$1410.00
- d) \$1523.00

Solution b)

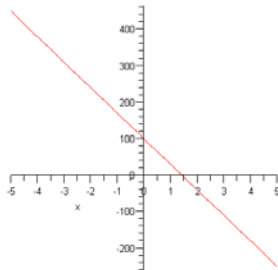
$$S = 60(20) + 100 = 1200 + 100 = \$1300.00$$

28) Which graph represents the equation of the model in problem 27? $S = 60x + 100$

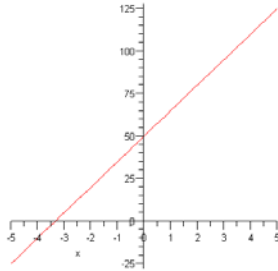
a)



b)



c)



d) None of the above

Solution: a