

Name: _____ **Total Possible Points = 150 Plus 10 pts Extra Credits**

1) City B is located at 75 miles west and 25 miles north of city A. City C is located at 100 miles east and 125 miles south of city A. Find the distance between city B and city C. You can choose city A as the origin of the rectangular coordinate system. Write your answer rounded to two decimal places, if necessary. (5 Points)

2) Find the standard form of equation of a circle with endpoints of a diameter at (5, 9) and (-1, 3) (5 Points)

3) If (a, 10) is a point on the graph of $3x - 2y = 17$, what is a? (5 Points)

4) Find the x and y intercepts of the following $5x^2 + 6x - 8 - y = 0$ (5 Points)

5) An open box with a square base is required to have a volume of 27 cubic feet. Express the amount A of material used to make such a box as a function of the length x of a side of the base.

(5 Points)

6) Find the center and radius of the circle with the given equation

$$3x^2 + 3y^2 - 24x + 36y - 21 = 0$$

(7 points)

Solve

7)

$$4 - \frac{9}{7} = \frac{7}{3x}$$

(7 points)

8) Find the average rate of change for the function $f(x) = 4x^3 - 5x + 2$
between -4 to X

(7 points)

Algebraically Solve:

9) $\sqrt{2x+3} - x + 1 = 1$

(6 points)

10) David has available 400 yards of fencing and wishes to enclose a rectangular area.
(5 points Each)

a) Express the area A of the rectangle as a function of the width x of the rectangle.

b) What is the domain of A ?

11) Write an equation of the line passing through the point $(6, 5)$ and perpendicular to the line $y = 3x - 5$. (10 points)

12) Use long division method and perform $3x^3 + 2x^2 - x + 3$ divided by $x - 3$ (10 points)

13) Each month a gas station sells x gallons of gas at \$2.19 per gallon. The cost to the owner of the gas station for each gallon of gas is \$1.99, and the monthly fixed cost for running the gas station is \$37000. (10 points)

a) Find the cost function. (Hint: Cost = Variable Cost + Fixed Cost)

- b) Find the revenue function. (Hint: Revenue = Price * Quantity)
- c) Write an equation that relates the monthly profit, in dollars, to the number of gallons of gasoline sold. (Hint: Profit = Revenue – Cost)
- d) If the monthly profit is \$113000, find the number of gallons of gas that are sold in that month.

||||) A wire of length x is bent into the shape of a circle. (10 points)

- a) Express the circumference of the circle as a function of x .

|||) Express the area of the circle as a function of x .

15) Find the value of $\frac{f(x+h) - f(x)}{h}$ assuming h is not zero for the function $f(x) = x^2 - 2x$
(Clearly state each of the steps of the process.)

(10 points)

16) Given $f(x) = -4x^2 + 3x + 15$ Find x such that $f(x) = 15$
(5 points)

17) Give the domain of the function.

(10 points)

a) $f(x) = 3x^2 + \frac{2}{x} + 5$

b) $f(x) = \sqrt{-x+10}$

c) $f(x) = \frac{x+7}{x^2+13x+42}$

d) $g(x) = \frac{x}{\sqrt{5-x}}$

18) Find the average rate of change for the function over the given interval.

$f(x) = 2x^2 + 3x$ between $x = 6$ and $x = 8$

(6 points)

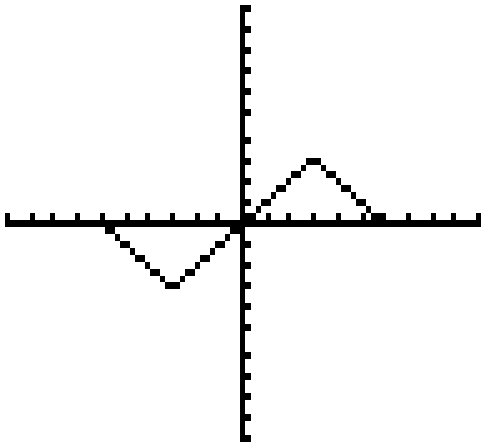
19) Let $P = (x, y)$ be a point on the graph of $y = x^2 - 8$

(10 points)

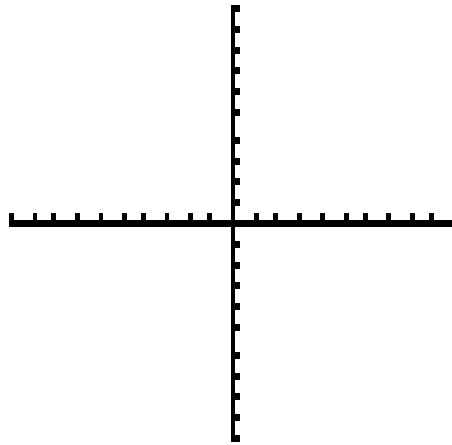
a) Express the distance d from P to the origin as a function of x .

- b) What is d if $x = 0$?
- c) What is d if $x = 1$?
- d) For what values of x is d smallest?

20) The graph of $y = f(x)$ is given below;
(7 points)



Sketch a graph of $y = f(x + 2) - 3$



21) **Extra Credit (10 points)**

Two cars are approaching an intersection. One is 2 miles south of the intersection and is moving at a constant speed of 30 miles per hour. At the same time, the other car is 3 miles east of the intersection and is moving at a constant speed of 40 miles per hour.

- a) Express the distance d between the cars as a function of time t .
- b) At time $t = 1$ Hour, what is the distance between the cars?