Name: **Total Possible Points = 150 plus 10 pts extra credit**

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

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

3) An open box with a square base is required to have a volume of 37 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.
     (7 Points)

Solve
4)

$$4 - \frac{9}{7} = \frac{7}{3x}$$
     (5 points)

5) 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)

6) Find the standard form of equation of a circle with endpoints of a diameter at (5 Points)

(5 , 9) and (-3, -3)

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

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

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9) $\square\square$ $\sqrt{2x+3} - x + 1 = 1$ (6 points)

10) David has available 600 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?

$\blacksquare$) 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.

12) A wire of length 4X is bent into the shape of a circle. (10 points)

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

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

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

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

15) 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)

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

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

18) Give the domain of the function. (10 points)

a) $f(x) = 3x^2 + \dfrac{2}{x} + 5$ b) $f(x) = \sqrt{-x + 10}$

c) $f(x) = \dfrac{x + 7}{x^2 + 13x + 42}$ d) $g(x) = \dfrac{x}{\sqrt{5 - x}}$
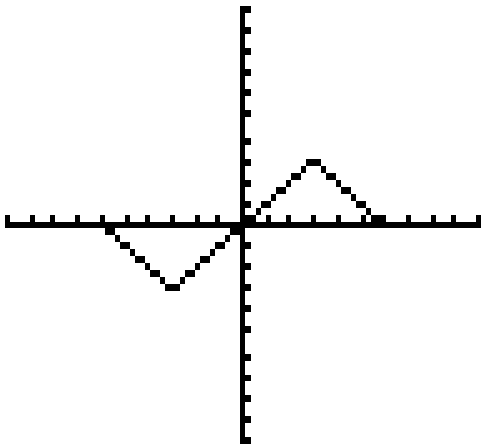
19) Let P = (x , y) be a point on the graph of $y = x^2 - 1$ (10 points)
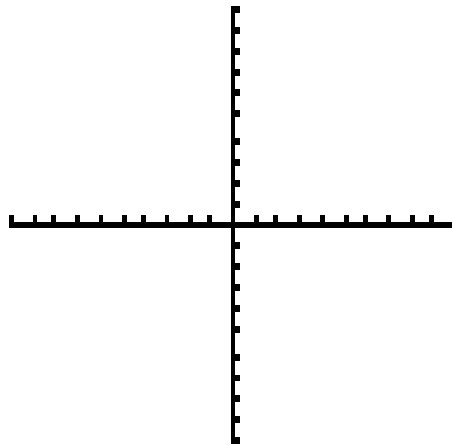
    a)   Express the distance d from P to the origin as a function of x.

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

21)   **Extra Credit (10 points)**
Two cars are approaching an intersection. One is 3 miles south of the intersection and is moving at a constant speed of 20 miles per hour. At the same time, the other car is 2 miles east of the intersection and is moving at a constant speed of 30 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?