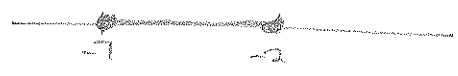


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18
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Show work for partial credit. Use straight edge for pranks.

1. Find and sketch on a number line the solution for $|2x + 9| \leq 5$



$$\begin{aligned} -5 &\leq 2x + 9 \leq 5 \\ -14 &\leq 2x \leq -4 \\ -7 &\leq x \leq -2 \end{aligned}$$

2. The distance between (2,5) and (-3,1) is $\sqrt{41}$. The slope of the line between these points is $\frac{4}{5}$.

$$\begin{aligned} &\sqrt{(5-1)^2 + (-3-2)^2} \\ &= \sqrt{4^2 + 5^2} = \sqrt{41} \end{aligned}$$

$$\frac{-3-2}{5-1} = \frac{-5}{4}$$

$$\frac{5-1}{2+3} = \frac{4}{5}$$

3. Who are the two men considered to be the inventors of analytic geometry?

Des Cartes
Fermat

4. What is the domain of $f(x) = \frac{1}{\sqrt{x+3}}$?

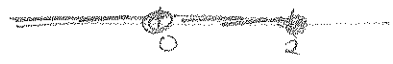
$$\begin{aligned} x+3 &> 0 \\ x &> -3 \end{aligned}$$

5. A function is defined by

$$f(x) = \begin{cases} 2x - 1, & x < 0 \\ 3, & 0 < x \leq 2 \end{cases}$$

a. What is the domain? Sketch on a number line.

$$x < 0, 0 < x \leq 2$$



b. Find $f(-1)$ and $f(1)$.

$$f(-1) = 2(-1) - 1 = -3 \quad f(1) = 3$$

c. Sketch the graph on the graph paper.

6. Find the equation of the line through (1,1) and (5,3).

$$\frac{3-1}{5-1} = \frac{2}{4} = \frac{1}{2}$$

$$y = \frac{1}{2}x + \frac{1}{2}$$

$$\frac{y-1}{x-1} = \frac{1}{2} \quad y-1 = \frac{1}{2}(x-1)$$

7. Find the equation of the line through (0,6) parallel to the line $y = 3x - 5$.

$$y = 3x + 6$$

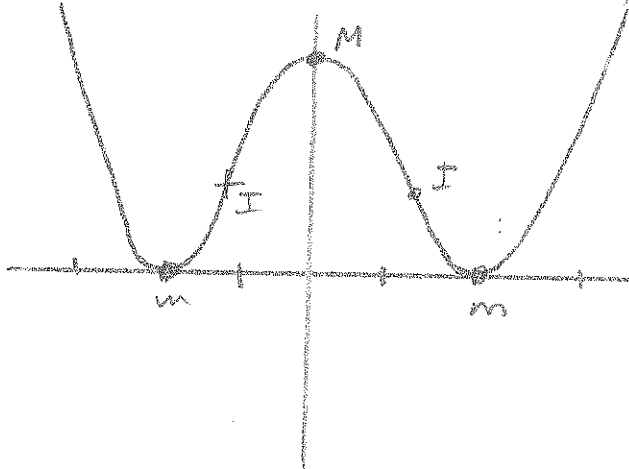
8. The graph of $x^4 - 8x^2 - y + 16 = 0$ is sketched below.

a. Mark local maxima (M), minima (m), and points of inflection (I).

b. Find the x and y intercepts. $y = 16$ $x = 2, -2$

c. Is the graph symmetric about the x-axis? *no* y-axis? *yes* the origin? *no*

d. Is this the graph of a function? *yes*



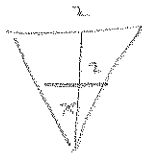
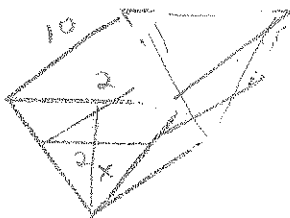
9. Suppose that a car costs \$800 per year to own (insurance plus decrease in value = depreciation) plus 15¢ per mile to operate. Give an equation for the total cost per year as a function of the number of miles driven in that year. Define variables and give units.

$x = \text{miles}$

$C = \text{cost in } \$$

$$C = 800 + .15x \quad x > 0$$

10. A tank with triangular ends is shown below. The ends are 2 yards wide by 2 yards high, and the tank is 10 yards long. Express the volume of water as a function of the depth when the tank is partially filled with water.



$$V = \frac{1}{2} x \cdot x \cdot 10 = 5x^2 \quad 0 \leq x \leq 2$$

$x = \text{depth in ft}$

$V = \text{vol in cu ft}$

Sketch each of the following graphs carefully on the attached graph paper.

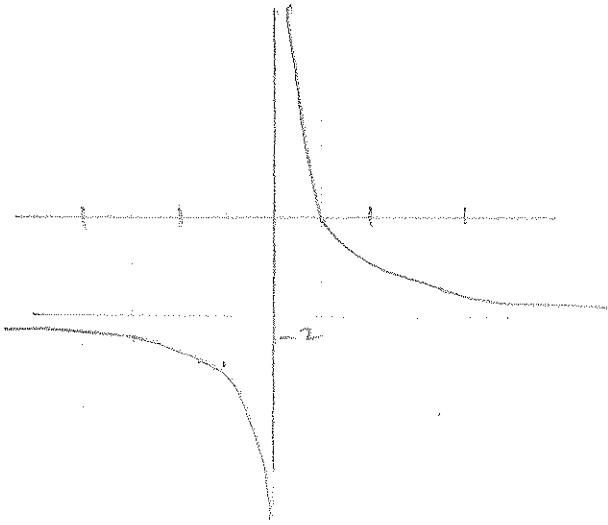
11. $y = \frac{1}{x} - 2$

12. $y = (x-1)^2(x+4)$

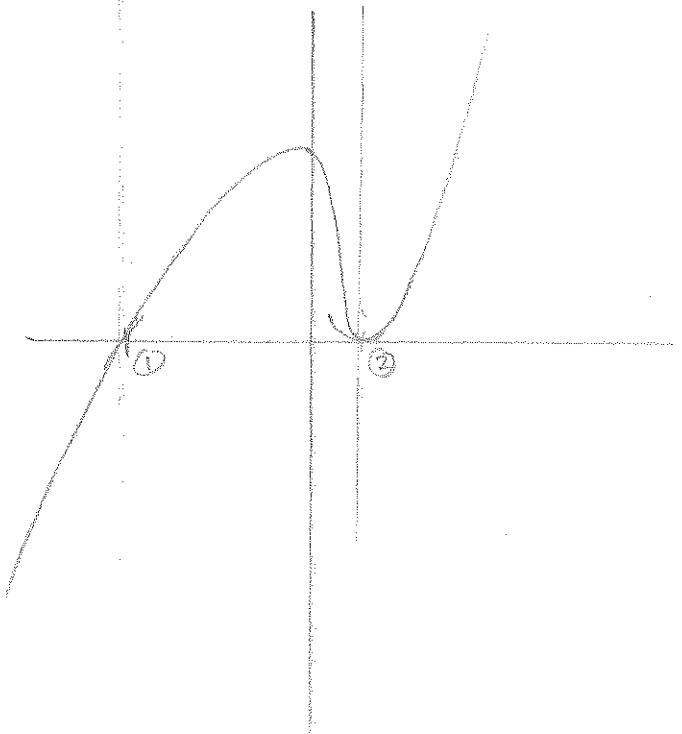
13. $y = x^4 - 2x^3 + x^2$

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$$y = \frac{1}{x} - 2$$



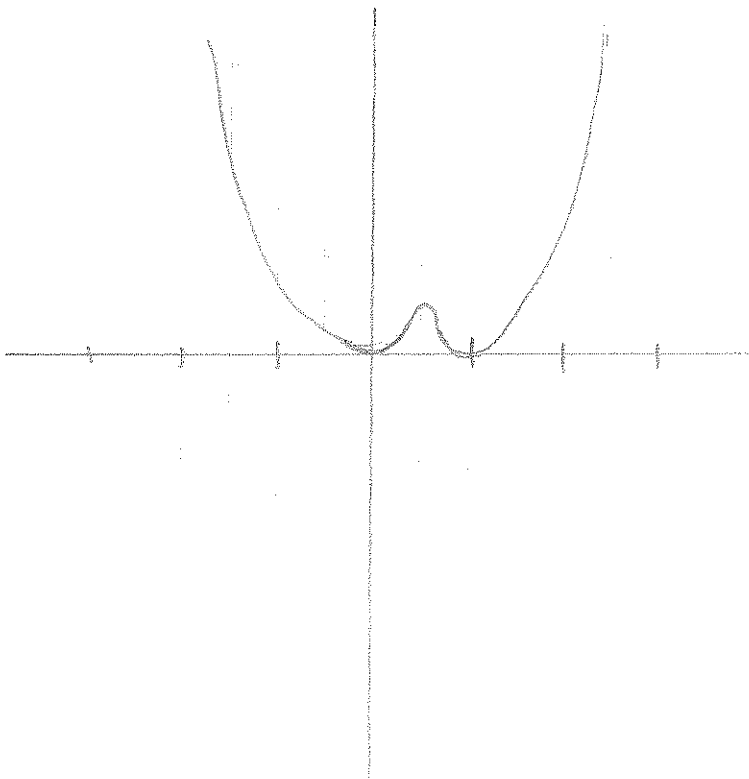
$$12 \quad y = (x-1)^2(x+4)$$



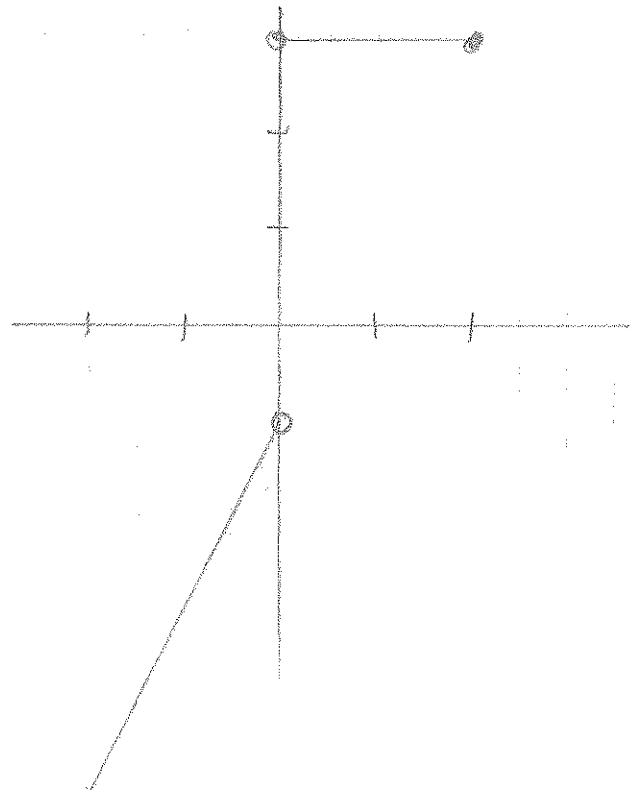
$$13. \quad y = x^4 - 2x^3 + x^2$$

$$= x^2(x^2 - 2x + 1)$$

$$= x^2(x-1)^2$$



$$5. \quad \begin{array}{l} 2x-1 < x < 0 \\ 3 < 0 < x < 2 \end{array}$$



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