



Success Center Practice Sheet

Math 112 Review

- 1) The vertices of a triangle are $(-2, 3)$, $(1, -2)$ and $(-7, 0)$.
 - a. Find the length of each side
 - b. Find the midpoint of each side
 - c. Describe the triangle

- 2) Write the equation of the circle in standard form and identify the center and the radius.
 - a. Center: $(3, -2)$, Point on the circle: $(4, 5)$
 - b. Endpoints of a diameter: $(3, -2)$, $(-3, 6)$

- 3) Identify the center and the radius of each circle.
 - a. $(x + 5)^2 + y^2 = 36$
 - b. $x^2 + y^2 + 4x - 2y - 4 = 0$

- 4) Find the equations of the following lines in slope-intercept form:
 - a. Through $(3, -5)$, $m = 2$
 - b. Through $(2, -3)$ and $(-2, -4)$
 - c. Through $(4, -2)$ and perpendicular to $3x - y = 2$
 - d. Through $(-2, 5)$ and parallel to the line through $(2, -7)$ and $(-6, -1)$

- 5) Find the equations of the following lines:
 - a. Through $(2, 3)$ and parallel to $y - 4 = 0$
 - b. Through $(2, 5)$ with undefined slope

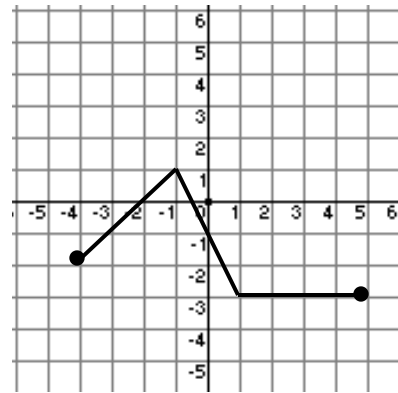
- 6) Find the x and y intercepts for each line and calculate the slope from the intercepts
 - a. $2x - 5y = 20$
 - b. $3x + 4y = -12$

- 7) Write each equation in slope-intercept form.
 - a. $5x - y = 6$
 - b. $3x + 2y = -12$

- 8) Let: $f(x) = x^2 - 4$ $g(x) = \sqrt{25 - x^2}$ $h(x) = \frac{3}{x^2 + 3x + 2}$ $k(x) = x^3 + x$ $p(x) = |x| + 2$
 - a. Find the domain of each function.
 - b. Evaluate: $f(3)$, $f(a + 2)$, $g(-5)$, $h(2)$, $p(-6)$
 - c. Is each function even, odd, or neither?
 - d. Where is f increasing, decreasing, or constant?
 - e. Where is p increasing, decreasing, or constant?

9) Use the graph to answer the following:

- What is the domain?
- What is the range?
- Where is the function increasing, decreasing, or constant?
- Write an algebraic rule for this function.



10) Let: $f(x) = 4x - 3$ $g(x) = \frac{x+3}{4}$ $h(x) = \sqrt{4x - 2}$ $j(x) = \frac{3x}{\sqrt{2+x}}$

Find each of the following:

- $(f - j)(2)$
- $(f \circ g)(6)$
- $(h \circ f)(x)$
- $(h \circ g)(5)$
- $(f \circ f)(x)$
- What is the domain of $(h \circ f)(x)$?

11) Divide using synthetic division: $(6x^3 - 3x + 2) \div (x + 4)$

12) Divide: $(2x^4 + 3x^3 + 7x^2 - 5x + 3) \div (2x + 1)$

13) Find all real zeros of $f(x) = x^5 + x^3 - 6x$

14) List all the possible zeros of $f(x) = 12x^3 + 40x^2 + 41x + 3$

15) Find all rational zeros.

- $f(x) = x^4 - 3x^3 - 8x^2 + 22x - 24$
- $f(x) = x^3 + 2x^2 + 9x + 18$

16) Find all zeros.

- $f(x) = 3x^4 + 4x^3 - x^2 + 4x - 4$
- $f(x) = x^4 - 3x^3 + 6x^2 + 2x - 60$; $1 + 3i$ is a zero

17) Find a polynomial with integer coefficients that has the given zeros.

- $\frac{1}{2}$, $\frac{2}{3}$, and -3
- $-3, -3$, and $2 + 4i$

18) Find any vertical, horizontal, and slant asymptotes. Graph.

- $f(x) = \frac{1}{x^2 - 2x - 3}$
- $f(x) = \frac{3x}{x - 5}$
- $f(x) = \frac{x^2 + 1}{x - 2}$

19) Solve the inequalities. Write the solutions in interval notation.

- $2x^3 + x^2 < 6x$
- $\frac{2x-4}{-3} > -4$
- $\frac{y+3}{y-5} > 1$
- $\frac{2}{x+1} < \frac{3}{x-1}$

20) Find the inverse of each function. State the domain and range of the function and its inverse.

a. $f(x) = \frac{x-5}{2}$

b. $f(x) = \sqrt[3]{5x+3}$

c. $f(x) = \sqrt{2x-1}$

21) Solve for x .

a. $32^x = 8^{x+1}$

d. $3^{x+1} = 2^x$

b. $\left(\frac{1}{3}\right)^{2x} = 9^{x-6}$

e. $4e^{x-2} + 6 = 70$

c. $\frac{1}{2} \ln(x-3) + 2 = 8$

f. $\log x + \log(2x-1) = 1$

g. $\log(x+14) - \log x = \log(x+6)$

22) Solve the systems.

a. $7x + 3y = 5$
 $2x + 4y = 3$

d. $3x + 2y - z = 4$
 $x + 2y - z = 3$
 $-2x - 4y + 2z = -1$

b. $x^2 - y = 4$
 $x + y = -2$

e. $x + 2y - 3z = 1$
 $3x + 5y - 8z = 7$
 $x + y - 2z = 5$

c. $2x - y + 4z = -1$
 $-3x + 5y - z = 5$
 $2x + 3y + 2z = 3$

f. $x^2 + y^2 \leq 25$
 $x + 2y \leq 5$

23) Solve the system using matrices:

$$\begin{aligned}x + 2y + z &= -4 \\ -2x + 4y - 3z &= 4 \\ 5x - 6y + 7z &= -12\end{aligned}$$

24) $16x^2 + 25y^2 - 32x + 50y + 16 = 0$

Find the following coordinates and then sketch the graph.

- Center
- Vertices
- Foci
- Endpoints of the minor axis

25) $9x^2 - y^2 - 36x - 6y + 18 = 0$

Find the following coordinates and then sketch the graph.

- Center
- Vertices
- Foci

26) $x^2 - 2x - 4y + 5 = 0$

Find the following and then sketch the graph.

- Vertex
- Focus
- Directrix

27) Expand:

a. $(x + 4)^5$

b. $(3x - 2y)^4$

28) Find the indicated term for each binomial expansion.

a. $(x + y)^7$; 4^{th} term

b. $(2x + y)^{12}$; 11^{th} term

29) Find the first five terms of the following sequences.

a. $a_n = n^2 - 1$

e. $a_1 = 4, a_{k+1} = 2a_k - 3$

b. Arithmetic: $a_4 = 10, a_5 = 14$

f. $a_n = \frac{(-1)^n}{n!}$

c. Arithmetic: $a_1 = 15, a_7 = -9$

d. Geometric: $a_3 = 1, a_4 = -\frac{1}{2}$

30) Find a_{12} of the following:

a. Arithmetic: $a_1 = 6, d = -5$

b. Geometric: $a_3 = \frac{1}{8}, r = \frac{1}{2}$

c. Arithmetic: $a_8 = 23, a_{20} = 59$

31) Evaluate each of the following sums.

a. $\sum_{n=1}^{10} n$

b. $\sum_{x=0}^5 4 - 3x$

c. $\sum_{n=0}^5 16 \left(\frac{1}{2}\right)^n$

32) Use sigma notation to write the following sums.

a. $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \dots + \frac{9}{10}$

b. $4 - 12 + 36 - 108 + \dots - 972$

c. $4 + 7 + 10 + \dots + 64$

33) Graph.

a. $f(x) = \begin{cases} x, & x \leq 0 \\ 3, & 0 < x \leq 4 \\ x + 1, & x > 4 \end{cases}$

i. $f(x) = \sqrt{-x} + 5$

j. $f(x) = -\sqrt{x+5} - 2$

b. $f(x) = \lceil \lceil x \rceil \rceil$

k. $f(x) = -\frac{1}{2}|x - 4| + 2$

c. $f(x) = \begin{cases} 2x, & x < 2 \\ x - 2, & x \geq 2 \end{cases}$

l. $f(x) = x^2 + 2x - 6$

d. $2x - y + 3 = 0$

m. $f(x) = 3^x$

e. $f(x) = -|x + 3|$

n. $f(x) = e^x - 1$

f. $(x - 2)^2 + y^2 = 16$

o. $f(x) = -e^{x+2}$

g. $f(x) = (x + 3)^2 - 4$

p. $f(x) = \log_2(x + 5) - 2$

h. $f(x) = x^3 - 3$

Answers

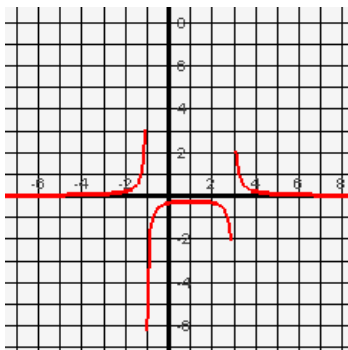
- 1) a. $\sqrt{34}, \sqrt{34}, 2\sqrt{17}$
b. $(-\frac{1}{2}, \frac{1}{2}), (-3, -1), (-\frac{9}{2}, \frac{3}{2})$
c. Right Isosceles Triangle
- 2) a. $(x - 3)^2 + (y + 2)^2 = 50$
Center = $(3, -2)$; $r = 5\sqrt{2}$
b. $x^2 + (y - 2)^2 = 25$
Center = $(0, 2)$; $r = 5$
- 3) a. Center = $(-5, 0)$; $r = 6$
b. Center = $(-2, 1)$; $r = 3$
- 4) a. $y = 2x - 11$
b. $y = \frac{1}{4}x - \frac{7}{2}$
c. $y = -\frac{1}{3}x - \frac{2}{3}$
d. $y = -\frac{3}{4}x + \frac{7}{2}$
- 5) a. $y = 3$
b. $x = 2$
- 6) a. x-intercept: $(10, 0)$
y-intercept: $(0, -4)$
 $m = \frac{2}{5}$
b. x-intercept: $(-4, 0)$
y-intercept: $(0, -3)$
 $m = -\frac{3}{4}$
- 7) a. $y = 5x - 6$
b. $y = -\frac{3}{2}x - 6$
- 8) a. $D_f: (-\infty, \infty)$
 $D_g: [-5, 5]$
 $D_h: (-\infty, -2) \cup (-2, -1) \cup (-1, \infty)$
 $D_k: (-\infty, \infty)$
 $D_p: (-\infty, \infty)$
- 8) b. $f(3) = 5$
 $f(a + 2) = a^2 + 4a$
 $g(-5) = 0$
 $h(2) = \frac{1}{4}$
 $p(-6) = 8$
c. f : even
 g : even
 h : neither
 k : odd
 p : even
d. Increasing: $(0, \infty)$
Decreasing: $(-\infty, 0)$
e. Increasing: $(0, \infty)$
Decreasing: $(-\infty, 0)$
- 9) a. $[-4, 5]$
b. $[-3, 1]$
c. Increasing: $(-4, -1)$
Decreasing: $(-1, 1)$
Constant: $(1, 5)$
d. $f(x) = \begin{cases} x + 2, & -4 \leq x < -1 \\ -2x - 1, & -1 \leq x < 1 \\ -3, & 1 \leq x \leq 5 \end{cases}$
- 10) a. 2
b. 6
c. $\sqrt{16x - 14}$
d. $\sqrt{6}$
e. $16x - 15$
f. $[\frac{7}{8}, \infty)$
- 11) $6x^2 - 24x + 93 - \frac{370}{x+4}$
- 12) $x^3 + x^2 + 3x - 4 + \frac{7}{2x+1}$
- 13) $0, \pm\sqrt{2}$
- 14) $\pm 1, \pm 3, \pm \frac{1}{2}, \pm \frac{3}{2}, \pm \frac{1}{3}, \pm \frac{1}{4}, \pm \frac{3}{4}, \pm \frac{1}{6}, \pm \frac{1}{12}$

- 15) a. $-3, 4$
b. -2

- 16) a. $-2, \frac{2}{3}, -i, i$
b. $-2, 3, 1 + 3i, 1 - 3i$

- 17) a. $f(x) = 6x^3 + 11x^2 - 19x + 6$
b. $f(x) = x^4 + 2x^3 + 5x^2 + 84x + 180$

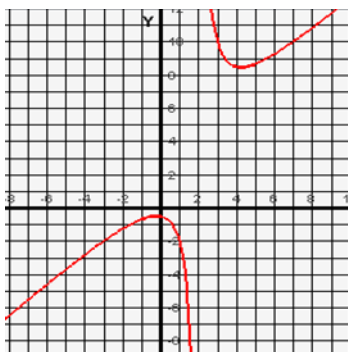
- 18) a. vertical asymptotes: $x = 3, x = -1$
horizontal asymptote: $y = 0$
slant asymptote: none



- b. vertical asymptote: $x = 5$
horizontal asymptote: $y = 3$
slant asymptote: none



- c. vertical asymptote: $x = 2$
horizontal asymptote: none
slant asymptote: $y = x + 2$



- 19) a. $(-\infty, -2) \cup (0, \frac{3}{2})$
b. $(-\infty, 8)$
c. $(5, \infty)$
d. $[-5, -1) \cup (1, \infty)$

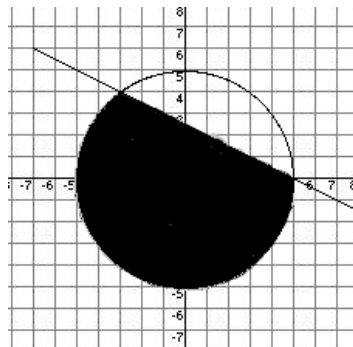
- 20) a. $D_f: (-\infty, \infty) \quad R_f: (-\infty, \infty)$
 $f^{-1}(x) = 2x + 5$
 $D_{f^{-1}}: (-\infty, \infty) \quad R_{f^{-1}}: (-\infty, \infty)$

- b. $D_f: (-\infty, \infty) \quad R_f: (-\infty, \infty)$
 $f^{-1}(x) = \frac{x^3 - 3}{5}$
 $D_{f^{-1}}: (-\infty, \infty) \quad R_{f^{-1}}: (-\infty, \infty)$

- c. $D_f: [\frac{1}{2}, \infty) \quad R_f: [0, \infty)$
 $f^{-1}(x) = \frac{x^2 + 1}{2}$
 $D_{f^{-1}}: [0, \infty) \quad R_{f^{-1}}: [\frac{1}{2}, \infty)$

- 21) a. $x = \frac{3}{2}$
b. $x = 3$
c. $x = e^{12} + 3$
d. $x = \frac{\ln 3}{\ln 2 - \ln 3}$
e. $x = \ln 16 + 2$
f. $x = \frac{5}{2}$
g. $x = 2$

- 22) a. $(\frac{1}{2}, \frac{1}{2})$
b. $(-2, 0), (1, -3)$
c. $(0, 1, 0)$
d. No solution
e. $(a + 9, a - 4, a)$
f.



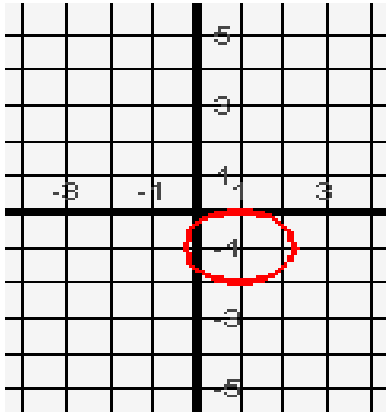
23) $\left(-\frac{5}{4}a - 3, \frac{1}{8}a - \frac{1}{2}, a\right)$

24) Center: $(1, -1)$

Vertices: $\left(\frac{9}{4}, -1\right), \left(-\frac{1}{4}, -1\right)$

Foci: $\left(\frac{7}{4}, -1\right), \left(\frac{1}{4}, -1\right)$

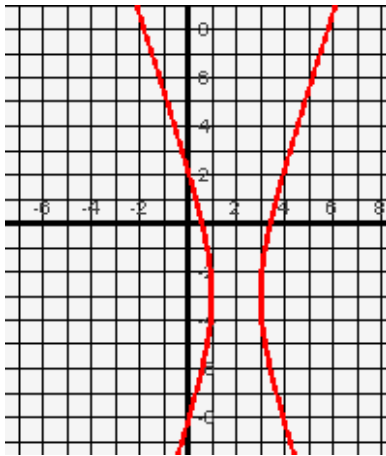
Minor Axis Endpoints: $(1, 0), (1, -2)$



25) Center: $(2, -3)$

Vertices: $(3, -3), (1, -3)$

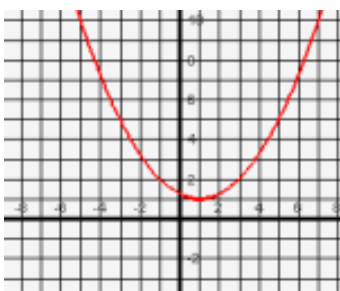
Foci: $(2 + \sqrt{10}, -3), (2 - \sqrt{10}, -3)$



26) Vertex: $(1, 1)$

Focus: $(1, 2)$

Directrix: $y = 0$



27) a. $x^5 + 20x^4 + 160x^3 + 640x^2 + 1280x + 1024$

b. $81x^4 - 216x^3y + 216x^2y^2 - 96xy^3 + 16y^4$

28) a. $35x^4y^3$

b. $264x^2y^{10}$

29) a. 0, 3, 8, 15, 24

b. -2, 2, 6, 10, 14

c. 15, 11, 7, 3, -1

d. $4, -2, 1, -\frac{1}{2}, \frac{1}{4}$

e. 4, 5, 7, 11, 19

f. $-1, \frac{1}{2}, -\frac{1}{6}, \frac{1}{24}, -\frac{1}{120}$

30) a. -49

b. $\frac{1}{4096}$

c. 35

31) a. 55

b. -21

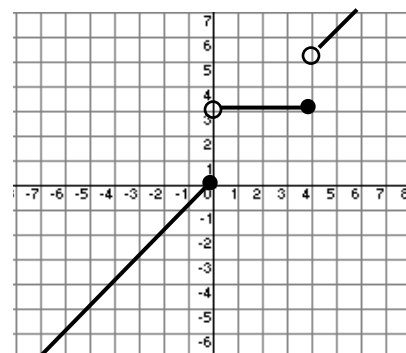
c. 31.5

32) a. $\sum_{n=1}^9 \frac{n}{n+1}$

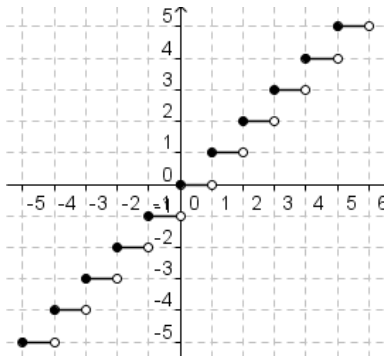
b. $\sum_{n=0}^5 4(-3)^n$

c. $\sum_{n=0}^{20} (4 + 3n)$

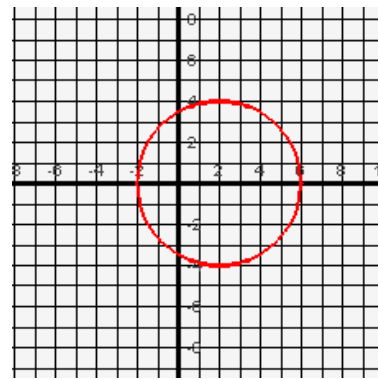
33) a.



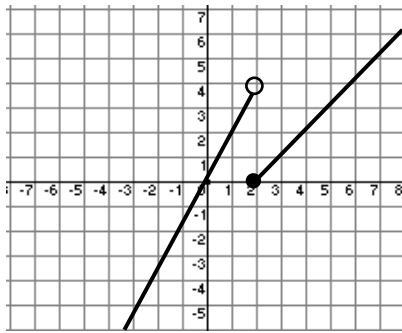
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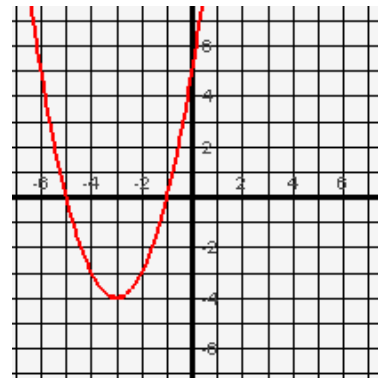
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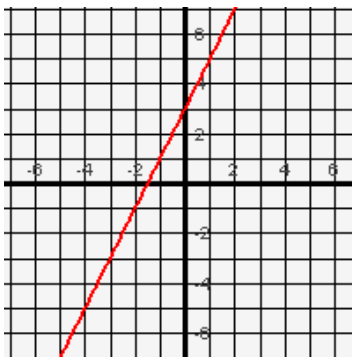
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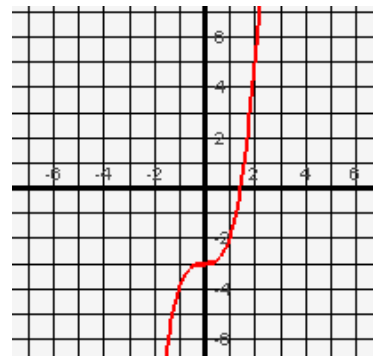
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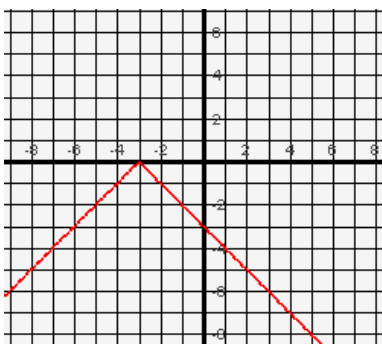
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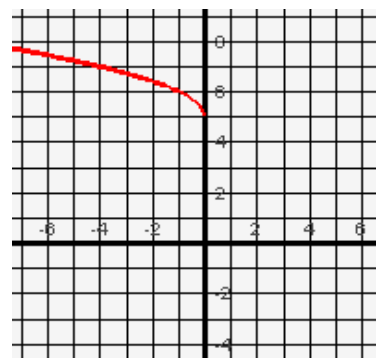
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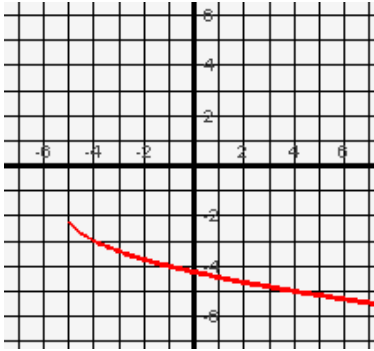
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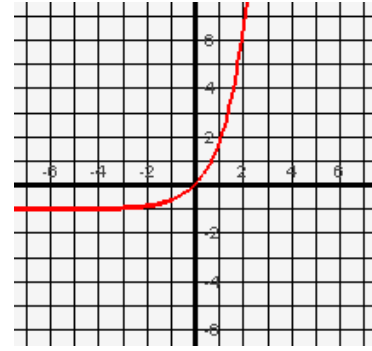
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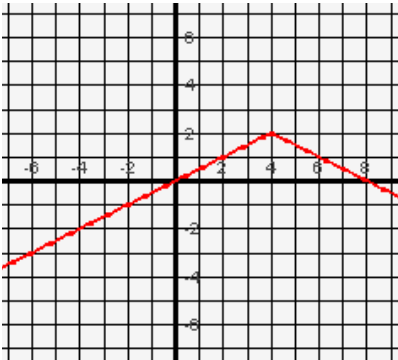
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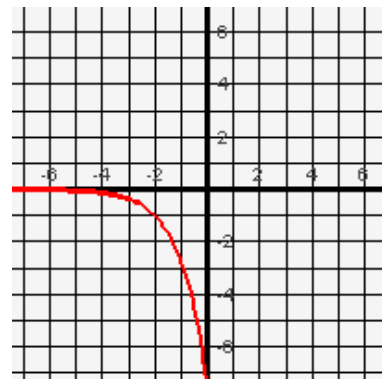
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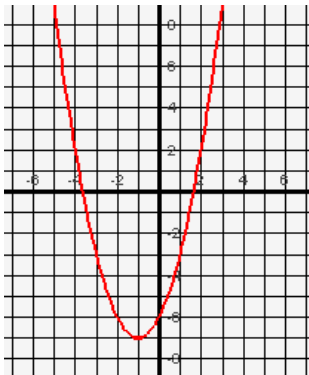
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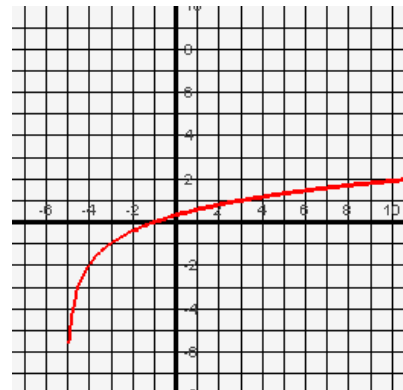
o.



l.



p.



m.

