

**MAC1105**  
**Ref. #: 864591**  
**Fall 2015 (2015\_1)**  
**Final Exam**

Name \_\_\_\_\_

Grade \_\_\_\_\_

Student ID \_\_\_\_\_

Date \_\_\_\_\_

**SHORT ANSWER. Show ALL work NEATLY in the space provided, and write the final answer on the answer line. No credit will be given if work is not shown or is not legible.**

**Find the vertex and axis of symmetry of the graph of the function.**

1)  $f(x) = -x^2 - 6x + 2$

1) \_\_\_\_\_

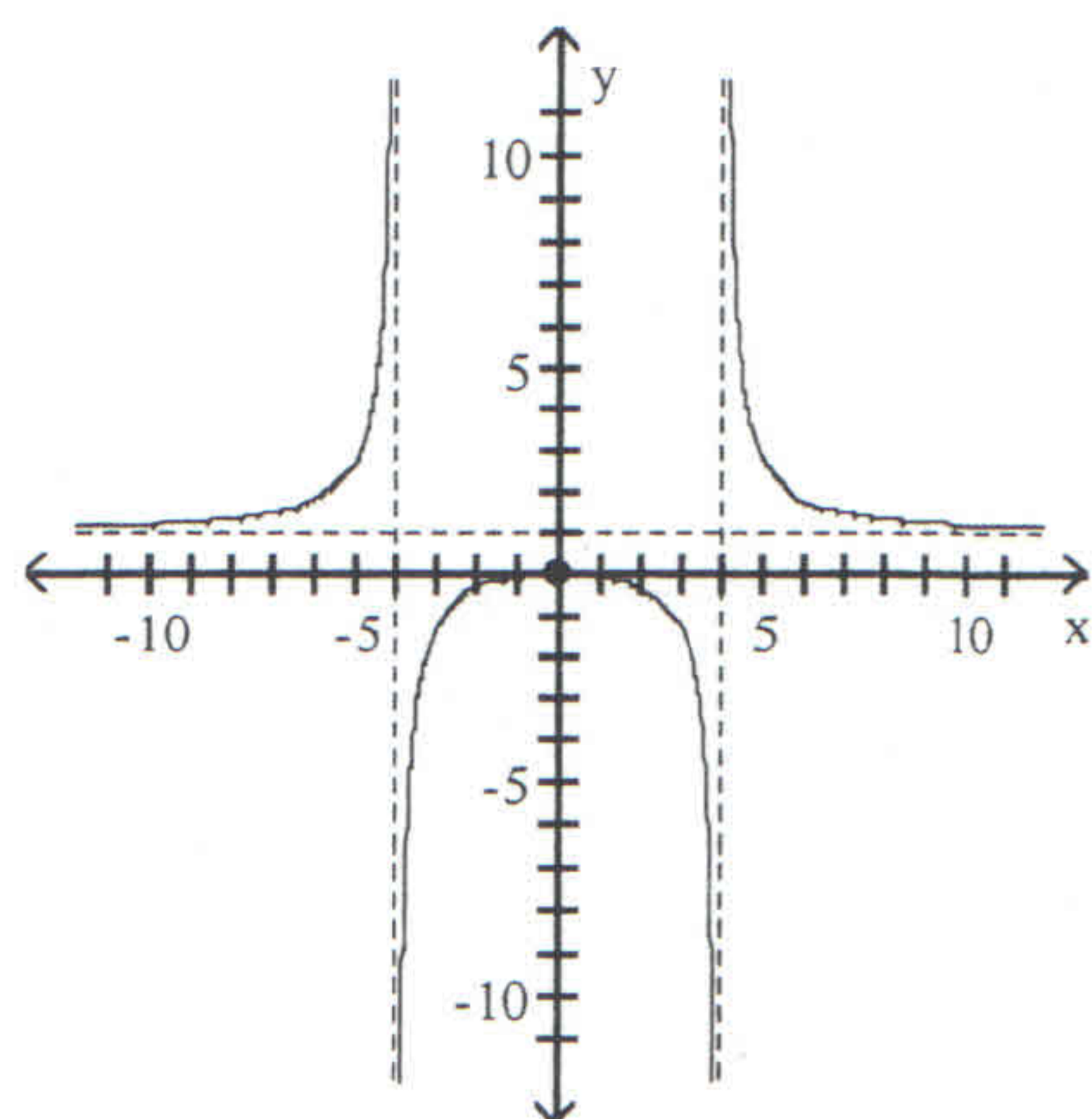
**Express as a single logarithm.**

2)  $4 \log_7 3 + \frac{1}{5} \log_7 (x - 6) - \frac{1}{2} \log_7 x$

2) \_\_\_\_\_

Use the graph to determine the domain and range of the function.

3)



3) \_\_\_\_\_

Find the real solutions of the equation.

4)  $x^4 - 26x^2 + 25 = 0$

4) \_\_\_\_\_

Write the expression in the standard form  $a + bi$ .

5)  $\frac{45 - 7i}{5 + 3i}$

5) \_\_\_\_\_

Find functions  $f$  and  $g$  so that  $f \circ g = H$ .

6)  $H(x) = \frac{1}{x^2 - 4}$

6) \_\_\_\_\_

Solve the equation.

7)  $\log_{42}(x^2 - x) = 1$

7) \_\_\_\_\_

Find the center (h, k) and radius r of the circle with the given equation.

8)  $4(x - 5)^2 + 4(y - 4)^2 = 52$

8) \_\_\_\_\_

Solve the exponential equation. Use a calculator to obtain a decimal approximation, correct to two decimal places, for the solution.

9)  $e^{x+7} = 5$

9) \_\_\_\_\_

Find the vertical asymptotes of the rational function.

10)  $f(x) = \frac{x + 11}{x^2 + 64x}$

10) \_\_\_\_\_

Solve the equation.

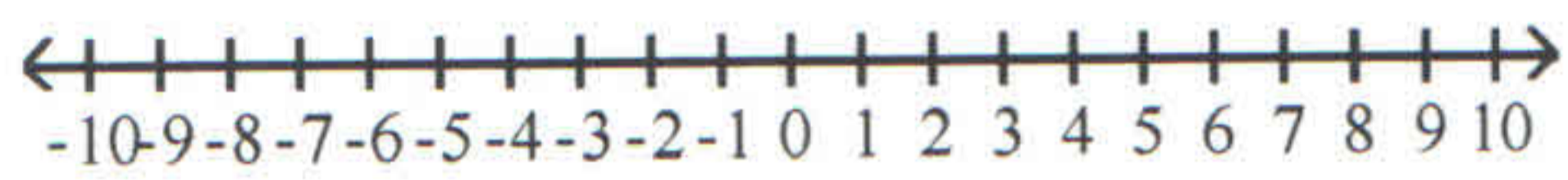
11)  $97x + 3 = 27$

11) \_\_\_\_\_

Solve the inequality. Express your answer using interval notation. Graph the solution set.

12)  $4x + 10 < 30$

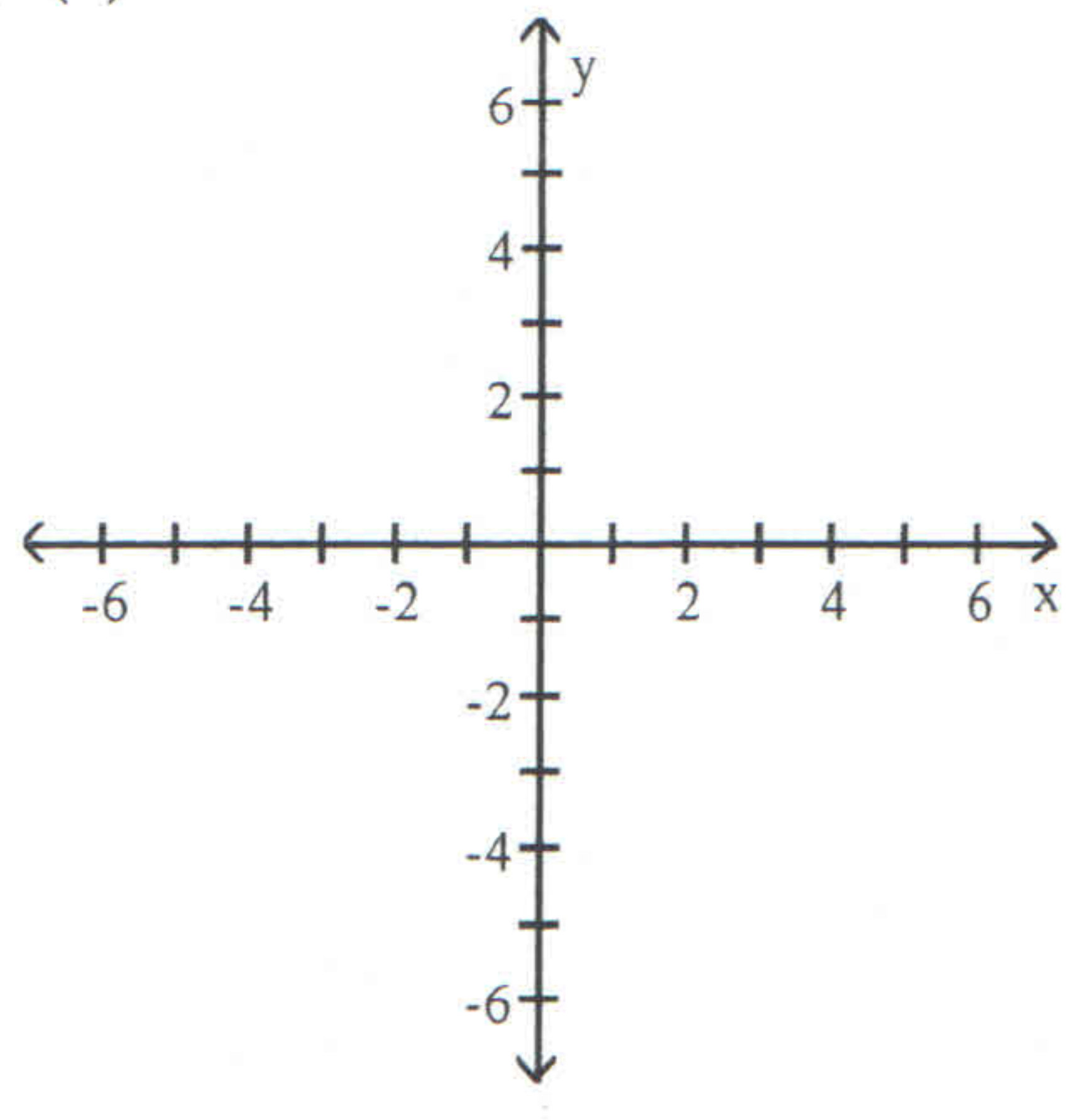
12) \_\_\_\_\_



Graph the function.

13)  $f(x) = 3(x + 2) + 1$

13) \_\_\_\_\_



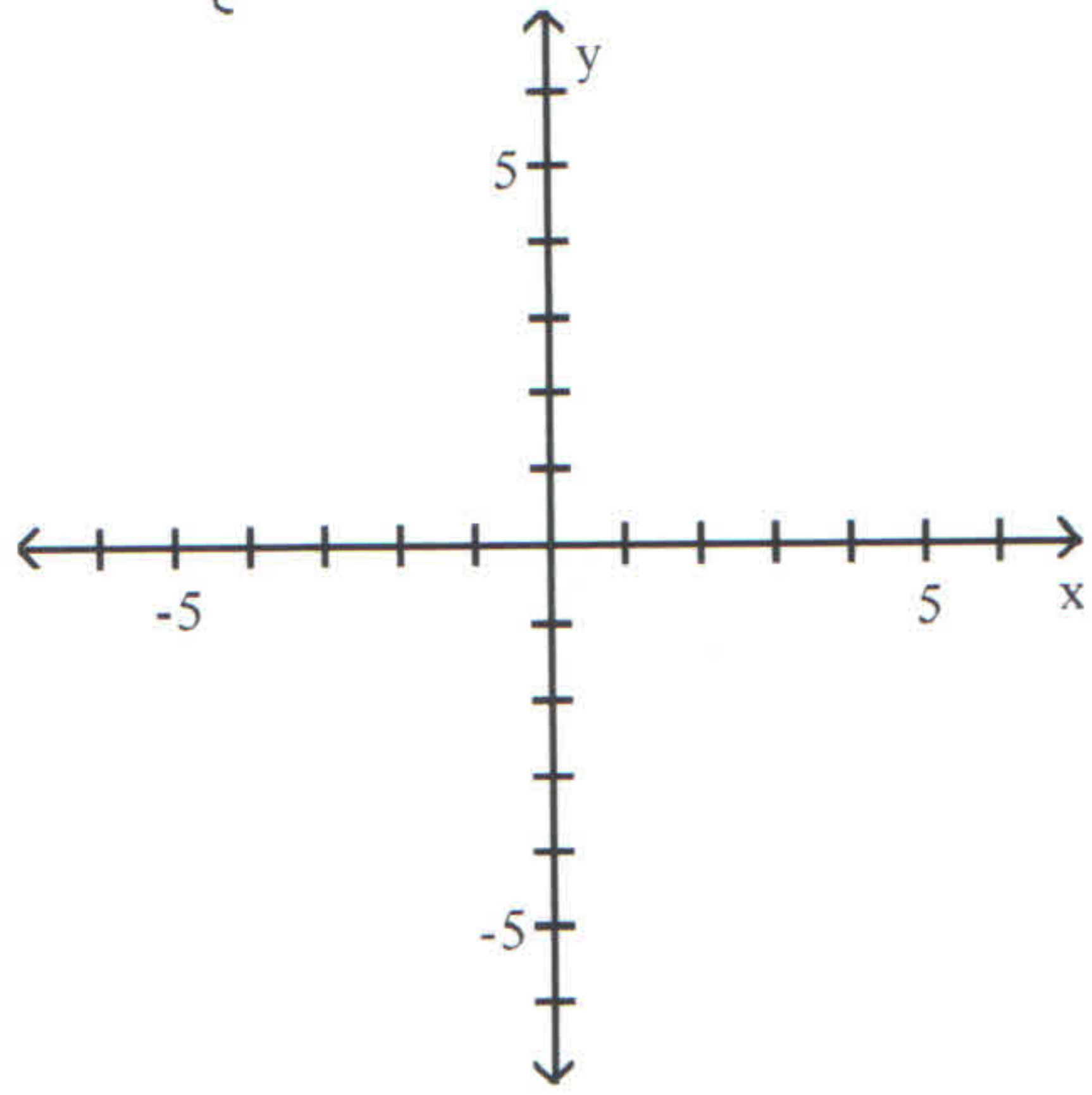
The function  $f$  is one-to-one. Find its inverse.

14)  $f(x) = \frac{-4x - 6}{-2x + 8}$

14) \_\_\_\_\_

Graph the function.

$$15) f(x) = \begin{cases} -x + 3 & \text{if } x < 2 \\ 2x - 3 & \text{if } x \geq 2 \end{cases}$$



15) \_\_\_\_\_

Solve the problem.

16) The function  $f(x) = 800(0.5)^{x/60}$  models the amount in pounds of a particular radioactive material stored in a concrete vault, where  $x$  is the number of years since the material was put into the vault. Find the amount of radioactive material in the vault after 110 years. Round to the nearest whole number.

16) \_\_\_\_\_

Use the Factor Theorem to determine whether  $x - c$  is a factor of  $f(x)$ .

17)  $f(x) = 7x^4 + 13x^3 - 2x^2 + x + 2; x + 2$

17) \_\_\_\_\_

Determine whether the given function is exponential or not. If it is exponential, identify the value of the base  $a$ .

18)

$x$	$H(x)$
-1	$\frac{9}{8}$
0	1
1	$\frac{8}{9}$
2	$\frac{64}{81}$
3	$\frac{512}{729}$

18) \_\_\_\_\_



**Find an equation for the line with the given properties.**

19) Perpendicular to the line  $x = 8$ ; containing the point  $(2, 1)$

19) \_\_\_\_\_

**Find the domain of the rational function and the intercepts.**

$$20) f(x) = \frac{-2x(x + 2)}{3x^2 - 4x - 7}$$

20) \_\_\_\_\_

**Solve (Bonus problem - 10 points).**

21) The relationship between Celsius ( $^{\circ}\text{C}$ ) and Fahrenheit ( $^{\circ}\text{F}$ ) degrees of measuring temperature is linear. Find an equation relating  $^{\circ}\text{C}$  and  $^{\circ}\text{F}$  if  $10^{\circ}\text{C}$  corresponds to  $50^{\circ}\text{F}$  and  $30^{\circ}\text{C}$  corresponds to  $86^{\circ}\text{F}$ . Use the equation to find the Celsius measure of  $12^{\circ}\text{F}$ .

21) \_\_\_\_\_

# Answer Key

## Testname: MAC1105 - FINAL EXAM

1)  $(-3, 11); x = -3$

2)  $\log_7 \frac{81\sqrt[5]{x-6}}{\sqrt{x}}$

3) domain:  $\{x \mid x \neq -4, x \neq 4\}$   
range:  $\{y \mid y \leq 0 \text{ or } y > 1\}$

4)  $\{-1, 1, -5, 5\}$

5)  $6 - 5i$

6)  $f(x) = \frac{1}{x}; g(x) = x^2 - 4$

7)  $\{-6, 7\}$

8)  $(h, k) = (5, 4); r = \sqrt{13}$

9)  $\{-5.39\}$

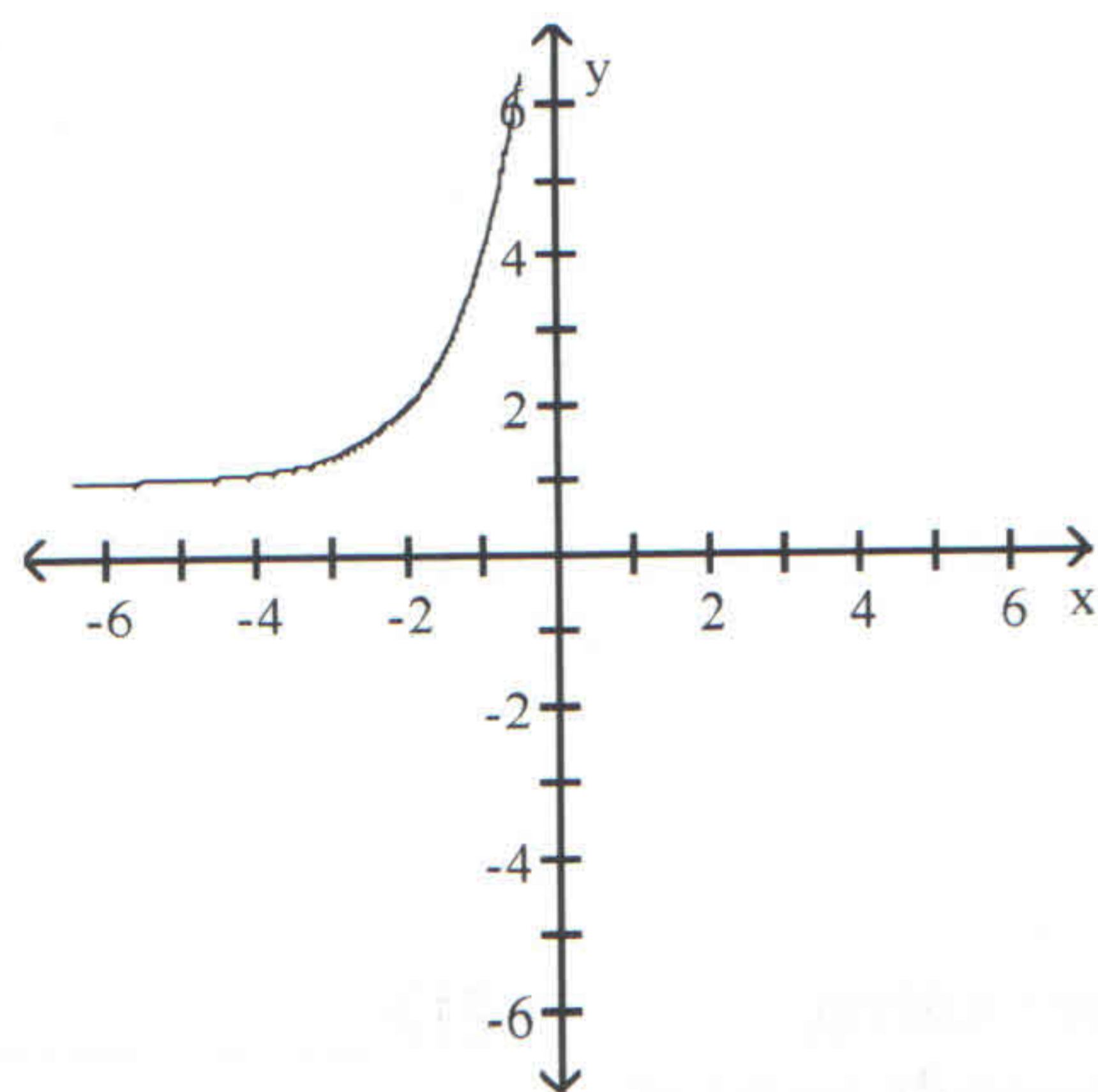
10)  $x = 0, x = -64$

11)  $\left\{-\frac{3}{14}\right\}$

12)  $(-\infty, 5)$

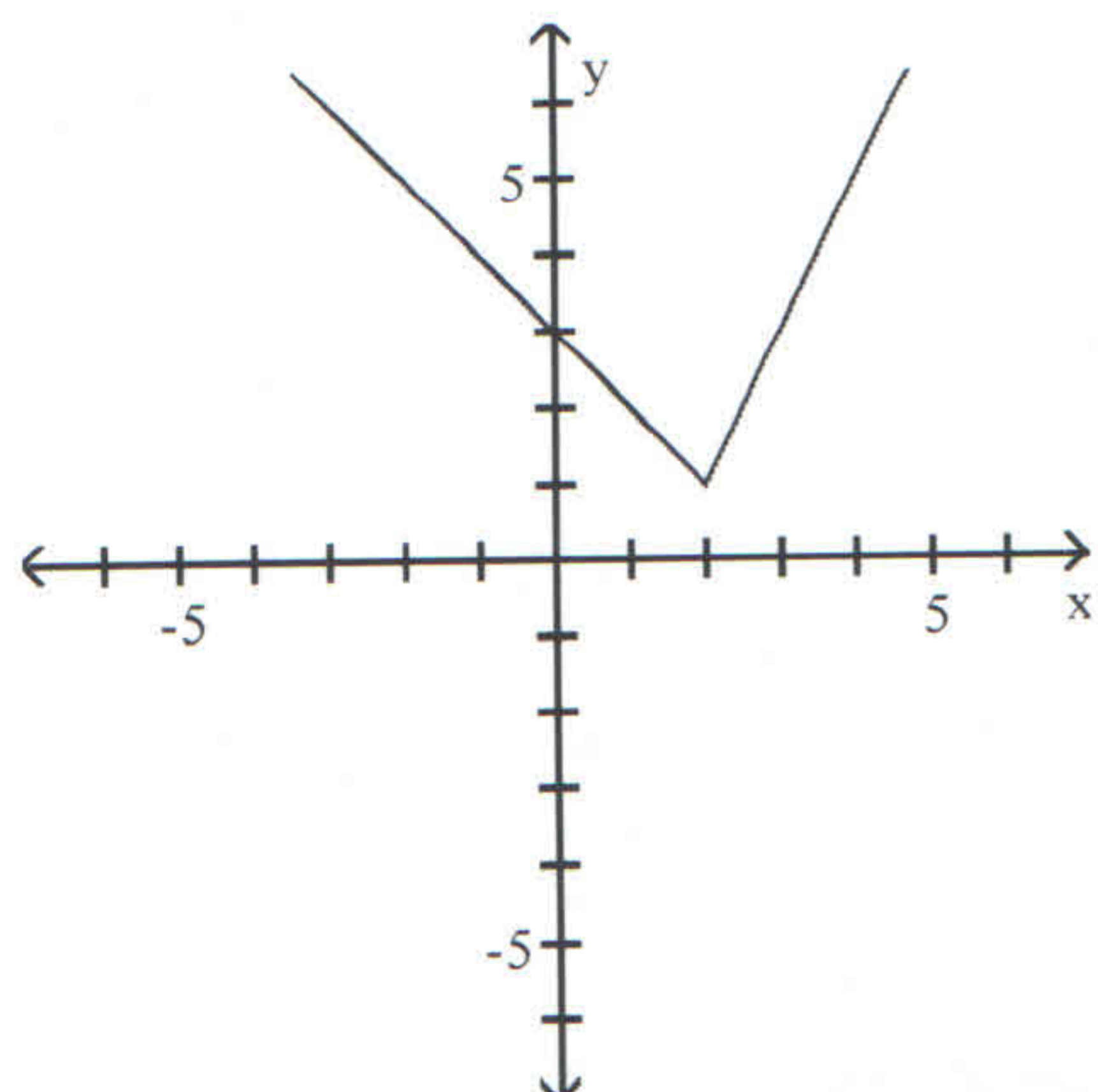


13)



14)  $f^{-1}(x) = \frac{-8x - 6}{-2x + 4}$

15)



16) 224 lb

Answer Key

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17) Yes

18) Exponential;  $a = \frac{8}{9}$

19)  $y = 1$

20)  $\left\{x \mid x \neq \frac{7}{3}, -1\right\}$

21)  $C = \frac{5}{9}F - \frac{160}{9}; -\frac{100}{9} \text{ } ^\circ\text{C}$