

PRACTICA SOBRE FUNCIONES DE CALCULO I (INGENIERÍA)

Name: _____ Class: _____ Date: _____

ID: A

Funciones y sus grficos

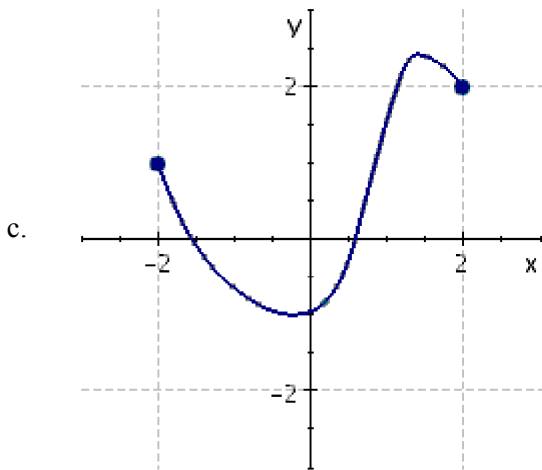
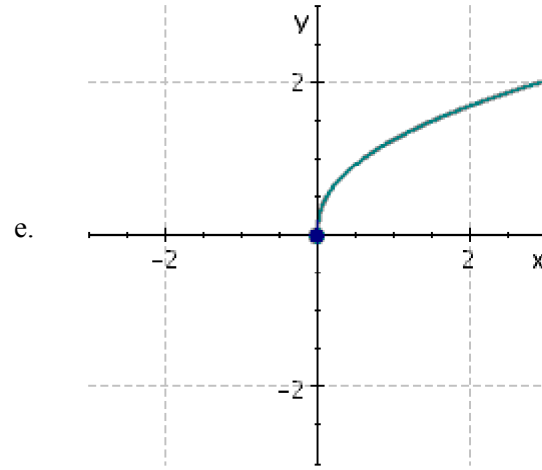
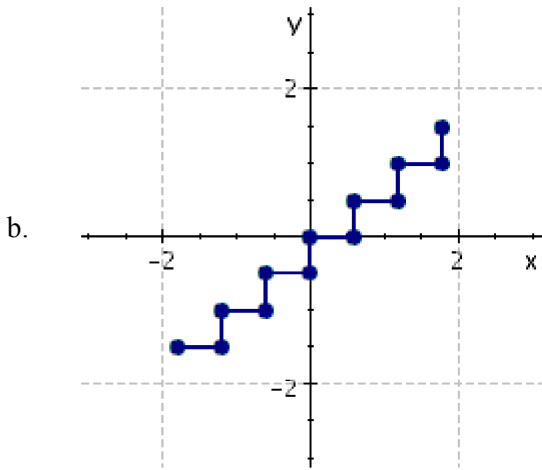
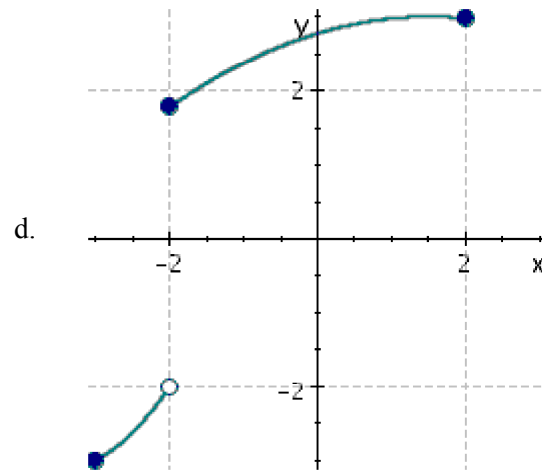
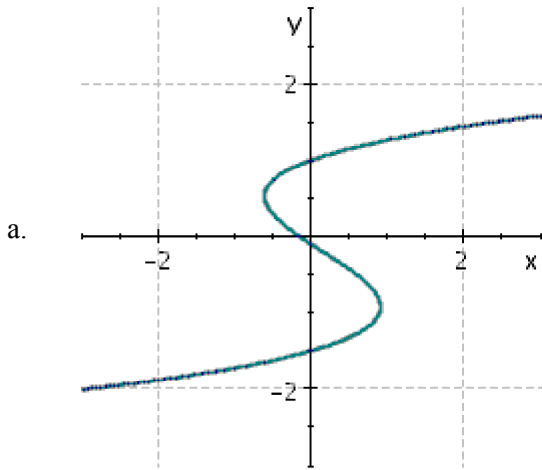
Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. Find the domain of the function $f(x) = \frac{3x + 2}{x^2 + 7x + 12}$.
- a. $(-\infty, -4) \cup (-3, \infty)$
 - b. $(-\infty, \infty)$
 - c. $(-\infty, -4) \cup (-4, -3) \cup (-3, \infty)$
 - d. $(-\infty, 0) \cup (0, \infty)$
 - e. $(-\infty, -4) \cup (-4, -3) \cup (-3, 0) \cup (0, \infty)$
- _____ 2. Find the domain of the function $g(u) = \sqrt{u + 1} + \sqrt{3 - u}$.
- a. $[-1, 3]$
 - b. $(-1, 3]$
 - c. $(-\infty, \infty)$
 - d. $[-1, \infty)$
 - e. $[-1, 9]$
- _____ 3. Which of the following intervals is the domain of the function $g(x) = \sqrt{x - 2}$?
- a. $x \in [2, \infty)$
 - b. $x \in [0, 2]$
 - c. $x \in (-\infty, 2]$
 - d. $x \in (2, \infty)$
 - e. $x \in (-\infty, 2]$
- _____ 4. Find the domain and range of the function $h(x) = \sqrt{81 - x^2}$.
- a. Range is $[-9, 9]$.
 - b. Domain is $[-9, 9]$.
 - c. Domain is $[0, 81]$.
 - d. Range is $[0, 9]$.
 - e. Domain is \mathbb{R} .

- _____ 5. Find the domain of the function $f(x) = \begin{cases} 4 - \frac{1}{2}x & \text{if } x \leq 3 \\ 7x - 2 & \text{if } x > 3 \end{cases}$.
- a. $x \in (-\infty, 3)$
 - b. $x \in (-\infty, \infty)$
 - c. $x \in (3, \infty)$
 - d. $x \in (-\infty, 3) \cup (3, \infty)$
 - e. $x \in (-\infty, 3]$
- _____ 6. If the point $(5, 3)$ is on the graph of an even function, what other point must also be on the graph?
- a. $(5, -3)$
 - b. $(-5, 3)$
 - c. $(-5, -3)$
 - d. $(5, 0)$
 - e. $(0, 3)$

7. Determine which of the following curves are the graphs of a function of x ?



_____ 8. Classify the following functions.

$$f(x) = \frac{x - 7}{x + 7} \quad g(x) = 2x + \frac{x}{\sqrt{x^2 - 6}}$$

- f is a rational function
- g is a rational function
- f is a polynomial function
- g is an algebraic function
- f is an algebraic function

_____ 9. Classify the following functions.

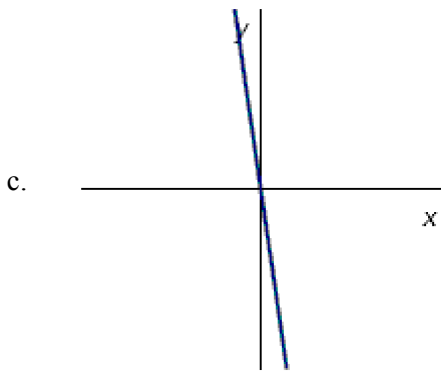
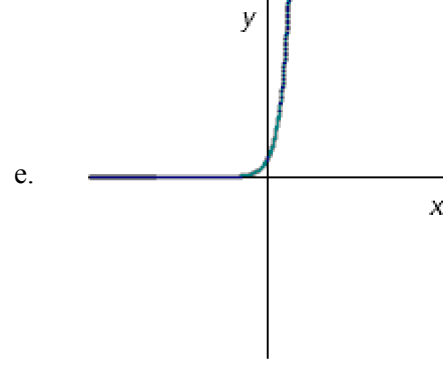
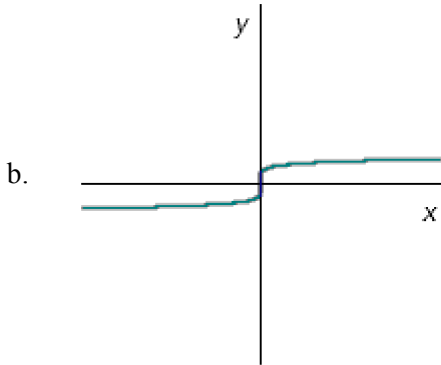
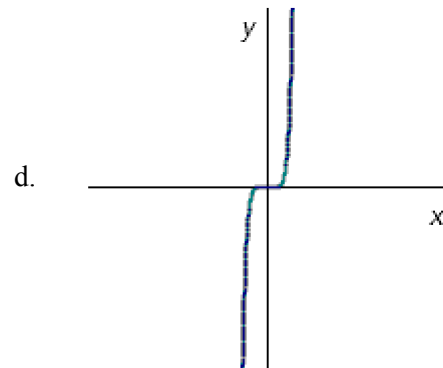
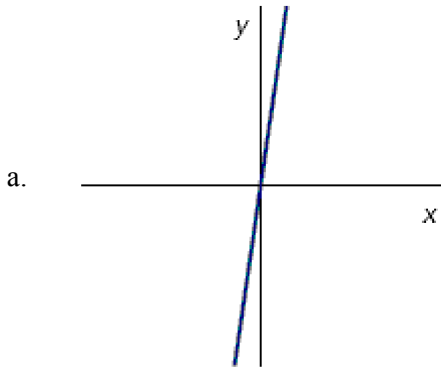
$$u(x) = \cos x + 5 \sin x \quad v(x) = x^8 + 4x^4 - \pi$$

- v is a trigonometric function
- v is a rational function
- u is an algebraic function
- u is a trigonometric function
- u is a polynomial function

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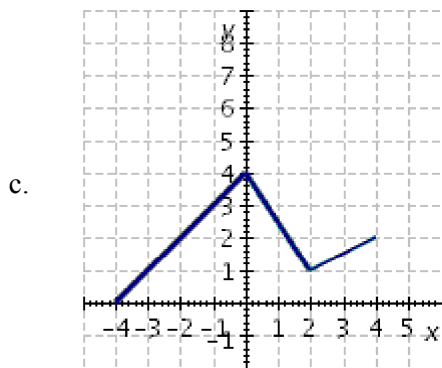
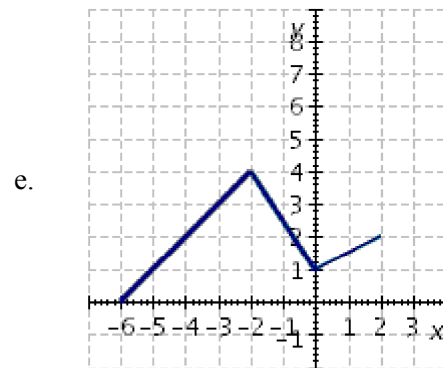
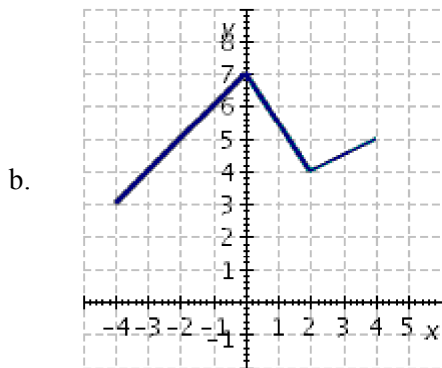
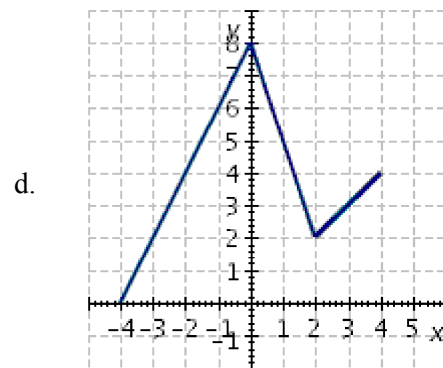
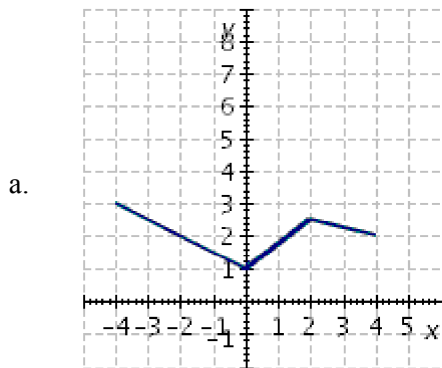
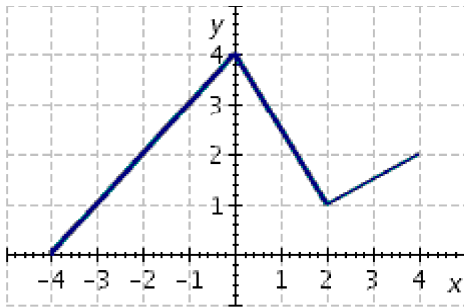
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___ 10. Sketch the graph of the equation $y = x^7$.

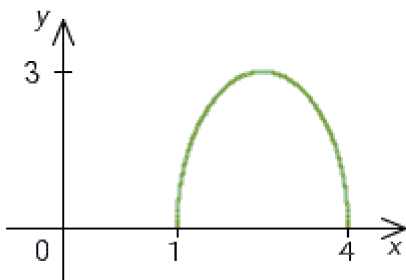
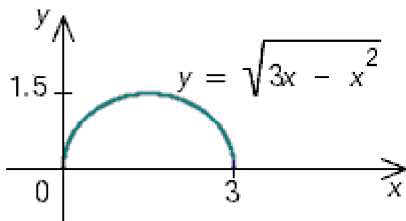


- _____ 11. Find functions f and g such that $F(x) = \sin(7\sqrt{x}) = (f \circ g)(x)$.
- a. $f(x) = \sqrt{x}$, $g(x) = \sin(7x)$
 - b. $f(x) = \sin(x)$, $g(x) = 7\sqrt{x}$
 - c. $f(x) = \sin(7x)$, $g(x) = \sqrt{x}$
 - d. $f(x) = \sqrt{x}$, $g(x) = \sin(x)$
 - e. $f(x) = g(x) = \sin(7\sqrt{x})$
- _____ 12. Find functions f , g and h such that $H(x) = 5 - 9^{x^2} = (f \circ g \circ h)(x)$.
- a. $f(x) = 5 - 9x$, $g(x) = x^x$, $h(x) = x^2$
 - b. $f(x) = 5 - x$, $g(x) = 9^x$, $h(x) = x^2$
 - c. $f(x) = 5 - 9^x$, $g(x) = 9^x$, $h(x) = x^2$
 - d. $f(x) = 9^x$, $g(x) = x^2$, $h(x) = 5 - x$
 - e. $f(x) = 5$, $g(x) = -9^x$, $h(x) = x^2$

13. The graph of f is given. Draw the graph of the function $y = f(x) + 3$.



_____ 14. The graph of $y = \sqrt{3x - x^2}$ is given. Use transformations to create a function whose graph is as shown.



- $y = 2\sqrt{x^2 - 3x + 1}$
- $y = \sqrt{x^2 - 5x + 4}$
- $y = \sqrt{-x^2 + 5x - 4}$
- $y = 2\sqrt{x^2 - 5x + 4}$
- $y = 2\sqrt{-x^2 + 5x - 4}$

_____ 15. Find $f + g$ and state its domain if $f(x) = x^3 + 16x^2$ and $g(x) = 17x^2 - 1$.

- $D = (16, \infty)$
- $(f + g)(x) = x^3 + x^2 + 1$
- $(f + g)(x) = x^3 + 33x^2 - 1$
- $D = \mathbb{R}$
- $(f + g)(x) = x^3 + x^2 - 1$

____ 16. Find $f - g$ and state its domain if $f(x) = x^3 + 13x^2$ and $g(x) = 14x^2 - 1$.

a. $(f - g)(x) = x^3 - x^2 + 1$

b. $(f - g)(x) = x^3 + 27x^2 - 1$

c. $(f - g)(x) = x^3 + x^2 - 1$

d. $D = \mathbb{R}$

e. $D = (13, \infty)$

____ 17. Find fg and state its domain if $f(x) = x^3 + 6x^2$ and $g(x) = 7x^2 - 1$.

a. $D = (6, \infty)$

b. $(fg)(x) = 7x^5 + 42x^4 - x^3 - 6x^2$

c. $(fg)(x) = 7x^5 + 44x^4 - x^3 - 6x^2$

d. $D = \mathbb{R}$

e. $(fg)(x) = 7x^5 + 40x^4 - x^3 - 6x^2$

____ 18. Find $\frac{f}{g}$ and state its domain if $f(x) = x^3 + 18x^2$ and $g(x) = 19x^2 - 1$.

a. $\left(\frac{f}{g}\right)(x) = \frac{x}{19} + 18x^2$

b. $D = (19, \infty)$

c. $\left(\frac{f}{g}\right)(x) = \frac{x^3 + 18x^2}{19x^2 - 1}$

d. $D = \left(-\infty, -\frac{1}{\sqrt{19}}\right) \cup \left(-\frac{1}{\sqrt{19}}, \frac{1}{\sqrt{19}}\right) \cup \left(\frac{1}{\sqrt{19}}, \infty\right)$

e. $\left(\frac{f}{g}\right)(x) = \frac{x}{19} - 18x^2$

____ 19. Find $f + g$ and state its domain if $f(x) = \sqrt{6 + x}$ and $g(x) = \sqrt{6 - x}$.

a. $D = (-6, 6)$

b. $(f + g)(x) = \sqrt{6 + x} + \sqrt{6 - x}$

c. $(f + g)(x) = \sqrt{12}$

d. $D = [-6, 6]$

e. $(f + g)(x) = \sqrt{2x}$

- _____ 20. Find $g \circ f$ and state its domain if $f(x) = \cos x$ and $g(x) = 9 - \sqrt{x}$.
- $(g \circ f)(x) = 9 - \sqrt{\cos x}$
 - $D = [0, \infty)$
 - $D = \left\{ x \mid x \in \left[-\frac{\pi}{2} + 2\pi n, \frac{\pi}{2} + 2\pi n \right], \text{ where } n \text{ is an integer} \right\}$
 - $(g \circ f)(x) = \cos(9 - \sqrt{x})$
 - $(g \circ f)(x) = \cos x + 9 - \sqrt{x}$

- _____ 21. Find $g \circ g$ and state its domain if $f(x) = \sin x$ and $g(x) = 4 - \sqrt{x}$.
- $(g \circ g)(x) = 4 - \sqrt{4 - \sqrt{x}}$
 - $D = [0, 16]$
 - $(g \circ g)(x) = 8 - 2\sqrt{x}$
 - $(g \circ g)(x) = (4 - \sqrt{x})^2$
 - $D = [0, \infty)$

- _____ 22. Use the table to evaluate $f(g(2))$.

x	1	2	3	4	5	6
$f(x)$	4	2	3	1	1	6
$g(x)$	5	4	1	2	1	4

- 4
 - 5
 - 6
 - 3
 - 1
- _____ 23. Find a formula for the inverse of the function $f(x) = \sqrt{19 - 3x}$.
- $f^{-1}(x) = -\frac{3}{19}x^2 + \frac{3}{19}, x \geq 0$
 - $f^{-1}(x) = -\frac{1}{3} + \frac{19}{3}x^2, x \geq 0$
 - $f^{-1}(x) = -\frac{19}{3}x^2 + \frac{1}{3}, x \geq 0$
 - $f^{-1}(x) = -\frac{1}{3}x + \frac{19}{3}, x \geq 0$
 - $f^{-1}(x) = -\frac{1}{3}x^2 + \frac{19}{3}, x \geq 0$

____ 24. Express $\ln z + a \ln x - b \ln y$ as a single logarithm.

a. $\ln \frac{yZ^b}{x^a}$

b. $\ln \frac{zX^a}{y^b}$

c. $\ln \frac{yX^b}{z^a}$

d. $\ln \frac{ZY^a}{x^b}$

e. $\ln \frac{YZ^a}{x^b}$

____ 25. Find a formula for the inverse of $y = \frac{3 + e^x}{3 - e^x}$.

a. $f^{-1}(x) = \ln \frac{3x - 1}{x + 1}$

b. $f^{-1}(x) = \ln 3$

c. $f^{-1}(x) = \ln \frac{3x - 1}{x - 1}$

d. $f^{-1}(x) = \ln \frac{3x + 1}{x + 1}$

e. $f^{-1}(x) = \ln \frac{3(x - 1)}{x + 1}$

____ 26. Find a formula for the inverse of the function $f(x) = 5x^3 + 6$.

a. $f^{-1}(x) = \frac{x - 6}{\sqrt[3]{5}}$

b. $f^{-1}(x) = \sqrt[3]{\frac{x}{5}} - 6$

c. $f^{-1}(x) = \sqrt[3]{\frac{x - 6}{5}}$

d. $f^{-1}(x) = \frac{\sqrt[3]{x} - 6}{5}$

e. $f^{-1}(x) = \frac{\sqrt[3]{x - 6}}{5}$

_____ 27. Find a formula for the inverse of the function $f(x) = \frac{9x - 1}{7x + 3}$.

a. $f^{-1}(x) = \frac{3x - 1}{7x - 9}$

b. $f^{-1}(x) = \frac{3x + 1}{9 + 7x}$

c. $f^{-1}(x) = \frac{3x + 1}{9 - 7x}$

d. $f^{-1}(x) = \frac{3x - 1}{9 - 7x}$

e. $f^{-1}(x) = \frac{3x - 1}{9 + 7x}$

_____ 28. If $g(x) = 3 + x + 2e^{x-2}$, find $g^{-1}(7)$.

a. -6

b. -2

c. 2

d. -4

e. 0

_____ 29. If f is a one-to-one function such that $f(2) = 1$, what is $f^{-1}(1)$?

a. 0

b. 2

c. 1

d. 3

e. -1

_____ 30. A function is given by a table of values. Determine whether it is one-to-one.

x	1	2	3	4	5	6
$f(x)$	3.7	3.6	3.2	3.5	5.2	2.1

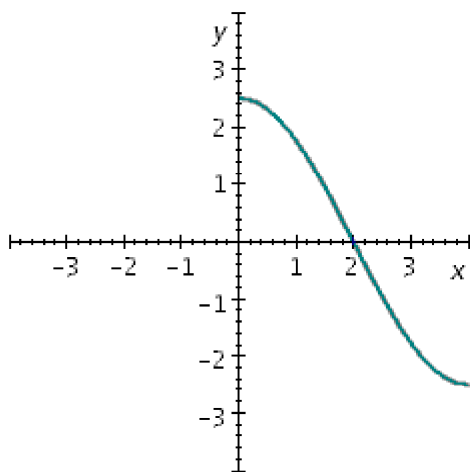
a. Yes

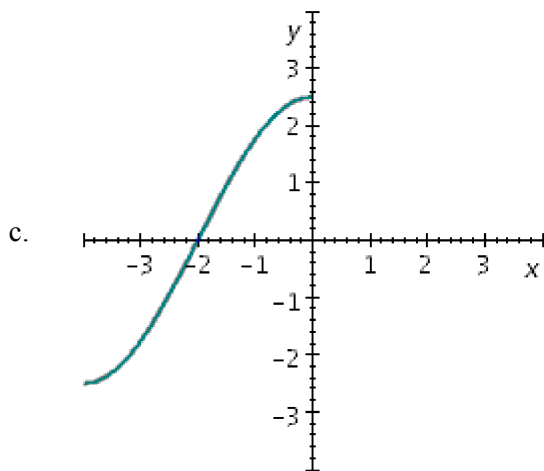
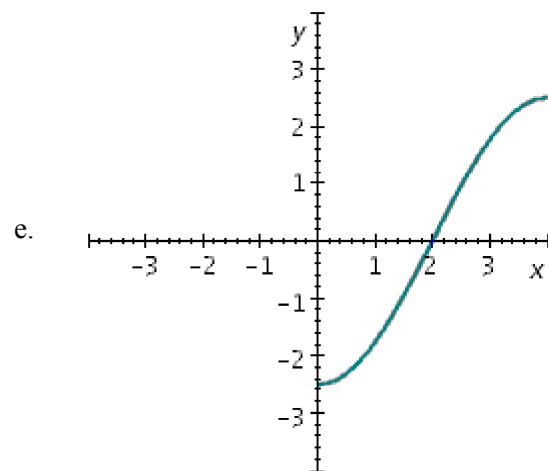
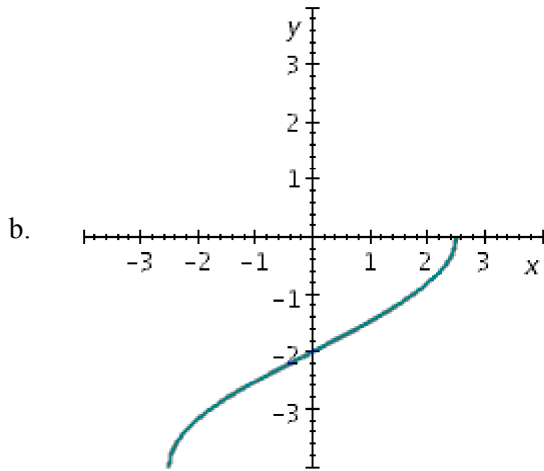
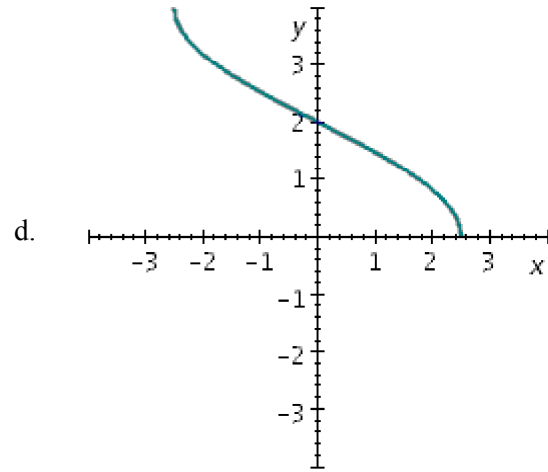
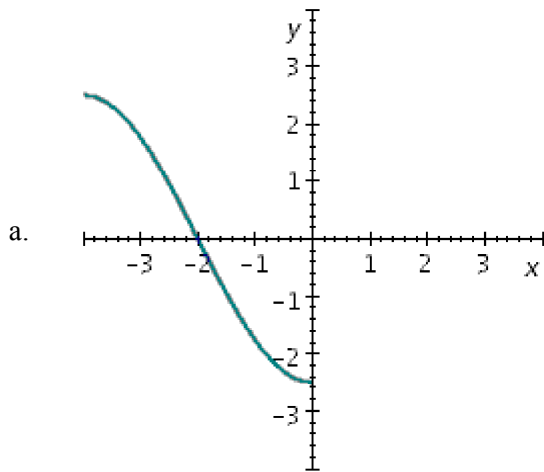
b. No

Name: _____

ID: A

____ 31. Use the given graph of f to sketch the graph of f^{-1} .





Completion

Complete each sentence or statement.

32. Use the table to evaluate each expression.

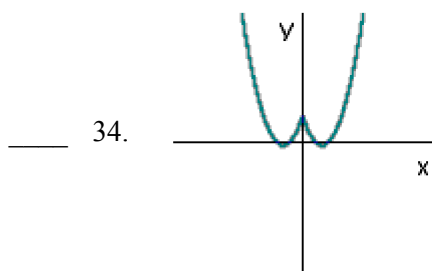
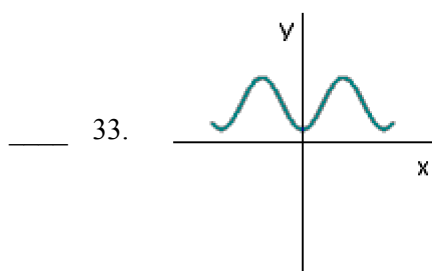
x	1	2	3	4	5	6
$f(x)$	3	1	4	2	2	6
$g(x)$	5	3	2	1	2	3

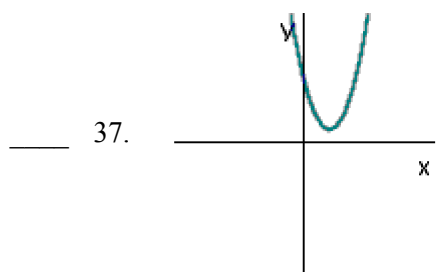
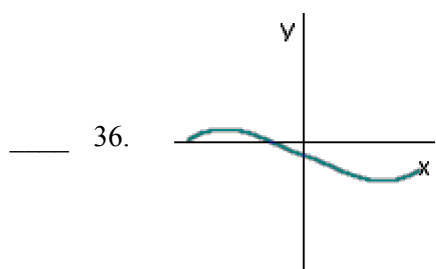
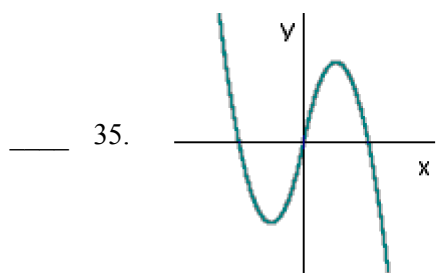
- (a) $f(g(1)) =$ _____
 (b) $g(f(1)) =$ _____
 (c) $f(f(1)) =$ _____
 (d) $g(g(1)) =$ _____
 (e) $(g \circ f)(4) =$ _____
 (f) $(f \circ g)(5) =$ _____

Matching

Determine whether each of the following graphs is even, odd, or neither.

- a. even
 b. odd
 c. neither even nor odd





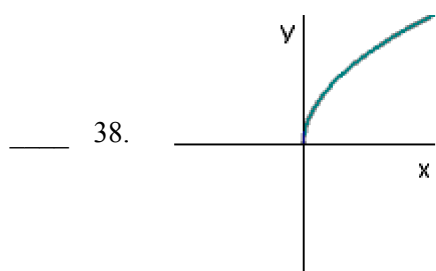
Match each equation with its graph.

a. $y = 2x$

b. $y = 2^x$

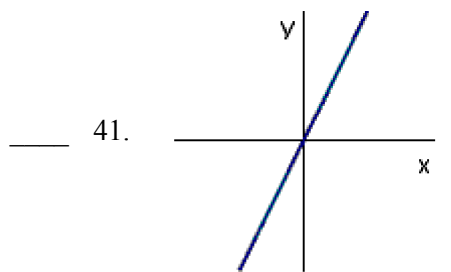
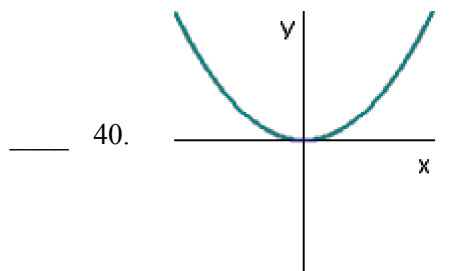
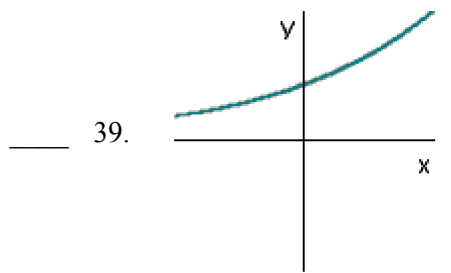
c. $y = x^2$

d. $y = \sqrt{x}$



Name: _____

ID: A



Short Answer

- 42. Find the domain of the function $g(u) = \sqrt{u + 4} + \sqrt{9 - u}$.
- 43. Express $\ln x + a \ln y - b \ln z$ as a single logarithm.
- 44. Find a formula for the inverse of the function $f(x) = \sqrt{4 - 7x}$.
- 45. Find a formula for the inverse of $f(x) = 7 - e^x$.