1. My name is SOLUTIONS

2. The vertical line test says that a graph is a graph of a function if every vertical line passes through the graph AT MOST ONCE

For exercises 3 through 6 answer either "True" or "False" and explain how you arrived at your conclusion.

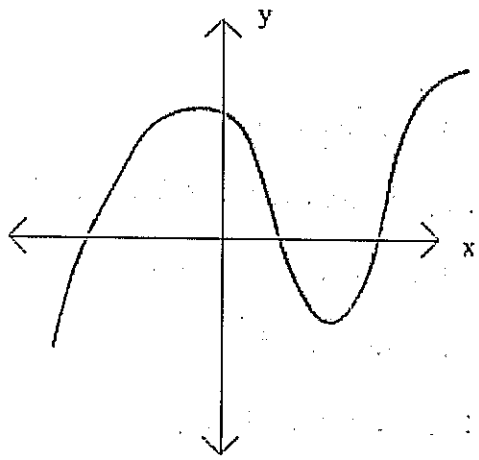
3. The graph of a function can never have more than one y-intercept.
TRUE, OTHERWISE X=0 WOULD HAVE MORE THAN ONE CORRESPONDING Y VALUE
4. The graph of a function can never have more than one x-intercept.
FALSE, ONE Y VALUE CAN BE ASSOCIATED TO MULTIPLE X VALUES
5. Every line is the graph of a function.
FALSE, VERTICAL LINES ARE NOT
6. Circles are never graphs of functions.
TRUE THEY VIOLATE THE VERTICAL LINE TEST

For exercises 7 - 10, a relation is given in the form of ordered pairs. Determine the domain, the range, state whether the relation is a function.

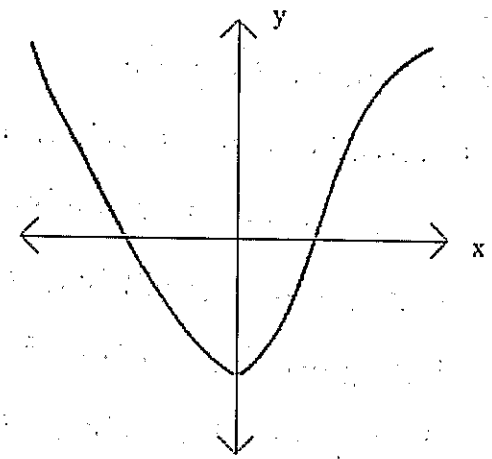
7. (1,2), (2,3), (3,4), (4,5), (7,7) D: $\{1,2,3,4,7\}$ R: $\{2,3,4,5,7\}$ FUNCTION
8. (-1,4), (0,5), (1,4), (2,3) D: $\{-1,0,1,2\}$ R: $\{3,4,5\}$ FUNCTION
9. (0,2), (1,6), (1,5), (9,12), (10,11) D: $\{0,1,9,10\}$ R: $\{2,5,6,11,12\}$ NOT A FUNC.
X=1 GOES TO TWO Y VALUES
10. (-3,-1), (-1,-3), (0,5), (2,1) D: $\{-3,-1,0,2\}$ R: $\{-3,-1,1,5\}$ FUNCTION

For exercises 11 through 14, graphs are given. Determine whether the graph is a function and explain your reasoning.

11.

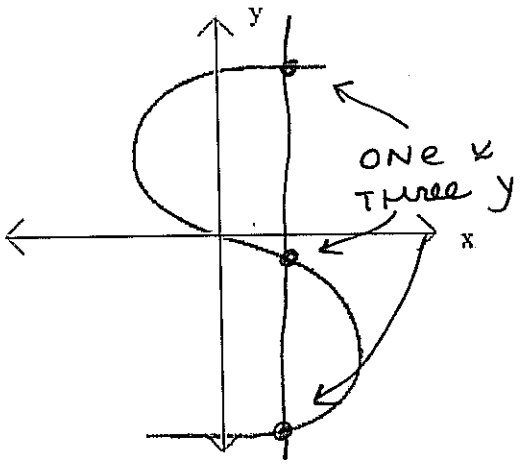


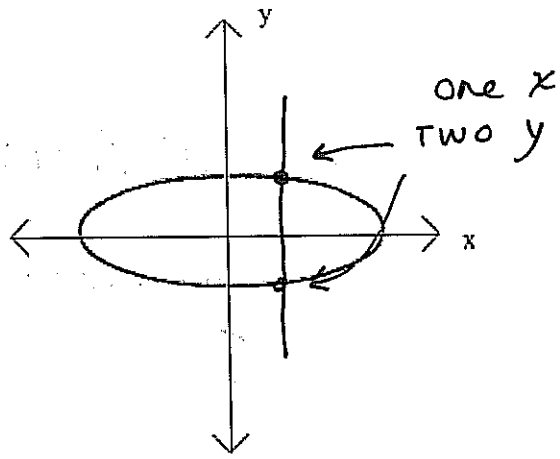
12.



FUNCTIONS

BECAUSE EVERY X CORRESPONDS TO AT MOST ONE Y VALUE

13. 

14. 

NOT FUNCTIONS
x values OFTEN correspond TO more THAN one y value

For exercises 15 - 18, determine the domain and range and state whether the relation described is a function.

15. Every person is assigned to his or her biological mother.
DOMAIN: PERSONS RANGE: BIOLOGICAL MOTHERS FUNCTION (EVERY PERSON HAS ONLY ONE BIOL. MOTHER)

16. Every mother is assigned to her children.
DOMAIN: MOTHERS TO THE WORDS RANGE: CHILDREN NOT A FUNCTION (MOTHER CAN HAVE MORE THAN ONE CHILD)

17. Every word is assigned that are generated during a Google search.
DOMAIN: WORDS RANGE: WORDS GENERATED IN SEARCH NOT A FUNCTION (ONE WORD GOES TO MANY)

18. Every Hotmail account user name is assigned to the corresponding password.
DOMAIN: ACCOUNT RANGE: PASSWORDS FUNCTION (EACH ACCOUNT HAS ONE PASSWORD)

For exercises 19 - 28, let $f(x) = 3x - 4$ and $g(x) = x^2 + x$ and $h(x) = 3$. Find the indicated value.

19. $f(2) = 3(2) - 4 = \boxed{2}$

20. $g(-1) = (-1)^2 - 1 = \boxed{0}$

21. $h(-4) = \boxed{3}$

22. $f(a - 1) = 3(a-1) - 4 = \boxed{3a - 7}$

23. $g(x + 1) = (x+1)^2 + (x+1) = x^2 + 2x + 1 + x + 1 = \boxed{x^2 + 3x + 2}$

24. $(f \circ g)(3) = f(g(3)) = f(3^2 + 3) = f(12) = 3(12) - 4 = 36 - 4 = \boxed{32}$

25. $(f \circ g)(4) = f(g(4)) = f(4^2 + 4) = f(20) = 3(20) - 4 = \boxed{56}$

26. $(f \circ g)(1) = f(g(1)) = f(1^2 + 1) = f(2) = 3(2) - 4 = \boxed{2}$

27. $(f \circ g)(2) = f(g(2)) = f(2^2 + 2) = f(6) = 3(6) - 4 = \boxed{14}$

28. $3f(x) - 2g(x) = 3(3x - 4) - 2(x^2 + x)$

$= 9x - 12 - 2x^2 - 2x$

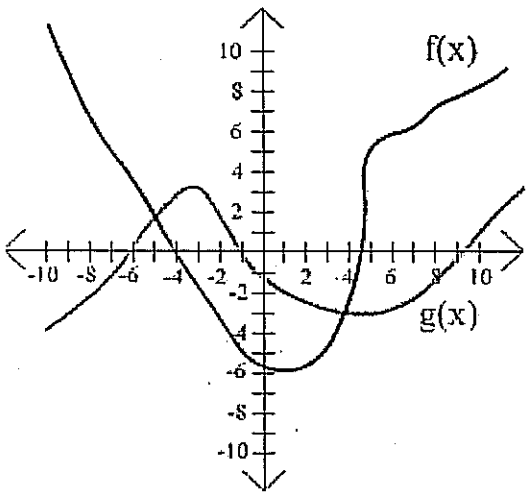
$= \boxed{-2x^2 + 7x - 12}$

29. $g(x+1) - g(x) = (x+1)^2 + (x+1) - (x^2+x) = x^2+2x+1+x+1-x^2-x = \boxed{2x+2}$

30. $(f \circ h)(2) = f(h(2)) = f(3) = 3(3)-4 = 9-4 = \boxed{5}$

31. $(g \circ h)(5) = g(h(5)) = g(3) = 3^2+3 = \boxed{12}$

For exercises 32 through 39, use the graphs shown below to approximate the indicated value.



32. $f(-10) = \boxed{10}$

33. $g(-3) = \boxed{3}$

34. $f(-1) = \boxed{-5}$

36. $g(8) = \boxed{-2}$

36. $(f \circ g)(0) = f(-1) = \boxed{-5}$

37. $(f \circ g)(-5) = f(2) = \boxed{-6}$

38. $(f \circ g)(2) = f(-2) = \boxed{-4}$

39. $(f \circ g)(6) = f(-3) = \boxed{-2}$

Find the domain of the functions given in exercises 40 - 43.

40. $f(x) = 3x - 4$ DOMAIN : $\mathbb{R}$

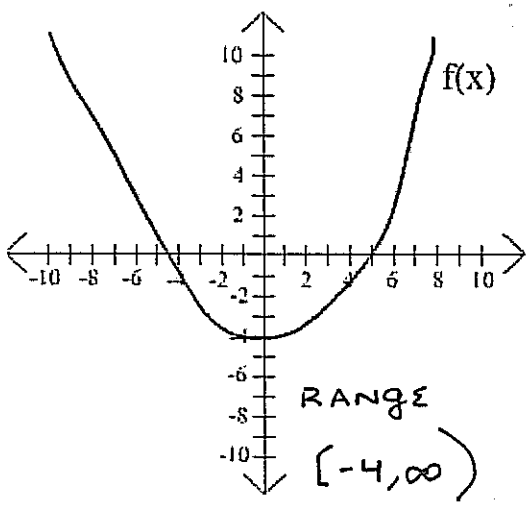
41. $f(x) = x^2 + x - 2$ DOMAIN : $\mathbb{R}$

42. $f(x) = \dfrac{x-2}{x+2}$ DOMAIN: $\mathbb{R} \setminus \{-2\}$

$f(x) = \dfrac{3x-4}{5x-1}$ DOMAIN : $\mathbb{R} \setminus \{1/5\}$

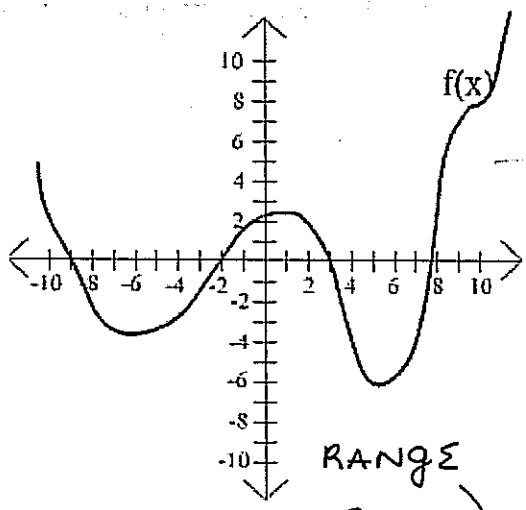
For exercises 44 - 47 use the given graphs to find the range of f(x).

44.



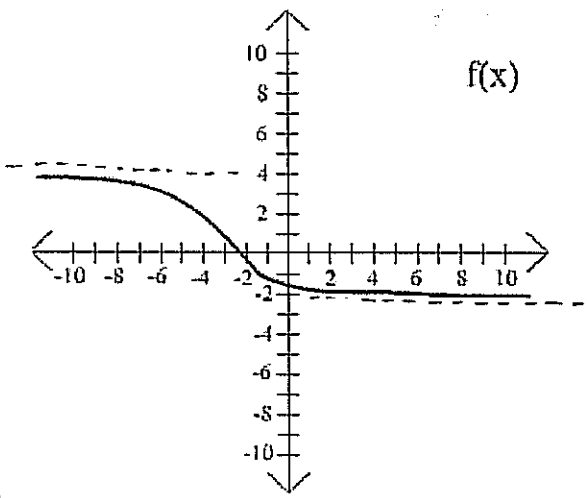
RANGE $[-4, \infty)$

45.



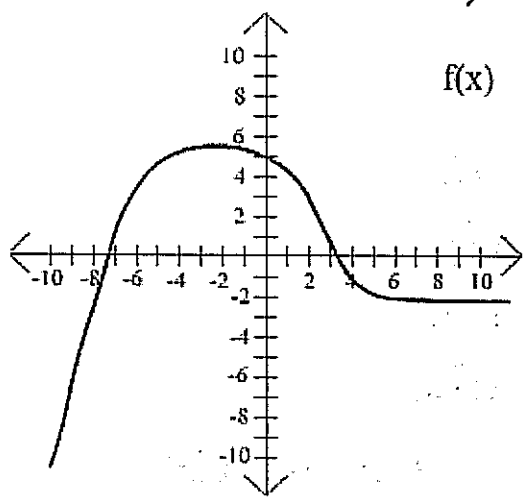
RANGE $[-6, \infty)$

46.



RANGE $(-2, 4)$

47.



RANGE $(-\infty, 5]$