SM 3H

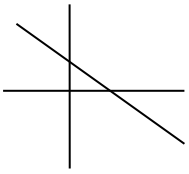
2023-2024

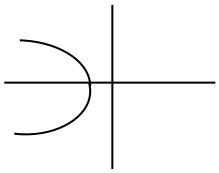
2.1 Functions

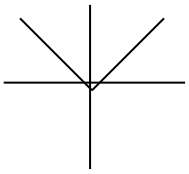
SCORE: /

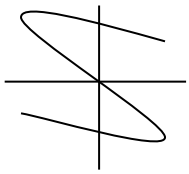
Name _____ Date _____ Period _____

Use the vertical line test to determine whether the curve is the graph of a function.

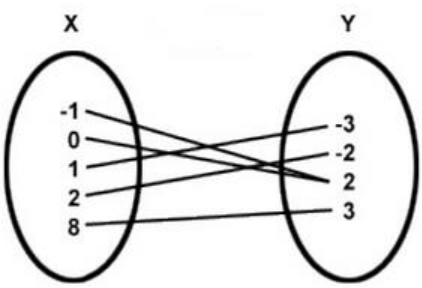
1. 

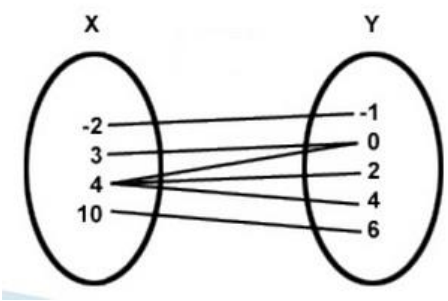
2. 

3. 

4. 

Determine whether each relation represents a function. For each function, state the domain and range.

5. 

6. 

7. $\{(2,6), (-3,6), (4,9), (2,10)\}$

8. $\{(-2,4), (-2,6), (0,3), (3,7)\}$

Find the following for each function.

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

(a) $f(0)$ (b) $f(1)$

(c) $f(-1)$ (d) $f(-x)$

(e) $-f(x)$ (f) $f(2x)$

10. $f(x) = \dfrac{x}{x^2 + 1}$

(a) $f(0)$ (b) $f(1)$

(c) $f(-1)$ (d) $f(-x)$

(e) $-f(x)$ (f) $f(2x)$

11. The frequency, in hertz, of a violin string can be modeled by the equation $f(t) = 49.1\sqrt{t}$, where t is the tension in newtons. What is the amount of tension applied if the frequency of the violin string is 278 hertz (find $f(t) = 278$)? **Round answer to nearest thousandths.**

12. A ball is thrown upward with an initial velocity of 80 ft. per second. The distance h (in feet) of the ball from the ground after t seconds is $h(t) = 80t - 16t^2$. For what time, t is the ball more than 96 feet above the ground (find $h(t) = 96$)?

Find the domain of the function algebraically. Write your answer in interval notation. Show work!

13. $f(x) = -5x + 4$

14. $f(x) = \frac{x-2}{x^3-x}$

15. $g(x) = \frac{x}{x^2-16}$

16. $f(x) = \frac{x}{x^2+1}$

17. $h(x) = \sqrt{-3x+12}$

18. $f(x) = \frac{4}{\sqrt{x-9}}$

19. $f(x) = \sqrt{4x+3}+2$

20. $f(x) = \frac{\sqrt{x-5}}{(x-7)(x^2+4)}$

For the given functions *f* and *g*, find the following. For parts *a* – *d*, find the domain.

21. $f(x) = x - 1; \quad g(x) = 2x^2$

(*a*) $(f + g)(x)$

(*b*) $(f - g)(x)$

Domain:

Domain:

(*c*) $(f \cdot g)(x)$

(*d*) $\left(\frac{f}{g}\right)(x)$

Domain:

Domain:

(*e*) $(f + g)(3)$

(*f*) $(f - g)(4)$

(*g*) $(f \cdot g)(2)$

(*h*) $\left(\frac{f}{g}\right)(1)$

22. Suppose that the revenue R, in dollars, from selling x cell phones, in hundreds, is $R(x) = 1.2x^2 + 220x$. The cost C, in dollars, of selling x cell phones is $C(x) = -0.05x^3 - 2x^2 + 65x + 500$.

a) Find the profit function, $P(x) = R(x) - C(x)$.

b) Find $P(15)$. Explain, in words, what the answer means.

c) Find $P(x) = \$319{,}200$. Explain, in words, what the answer means. (HINT: use calculator to graph)

23. The function $P(a) = 0.015a^2 - 4.962a + 290.580$ represents the population P, in millions, of Americans that are a years of age or older.

a) The independent variable is *a*. What does *a* represent? What is the smallest number that *a* could be?

b) Find $P(20)$. Explain, in words, what the answer means.

c) Find $P(0)$. Explain, in words, what the answer means.

Review

Factor.

24. $-x^2+2x+8$

25. $75x^2-363y^6$

26. $12x^2+25x-7$

27. x^4-16

28. Find the exact distance between the points $(-12,14)$ and $(-23,16)$.

29. Find the midpoint of the points $(32,15)$ and $(-10,-27)$.