

1. Solve $f(x) = \sqrt{x+8} = 1$ for x .

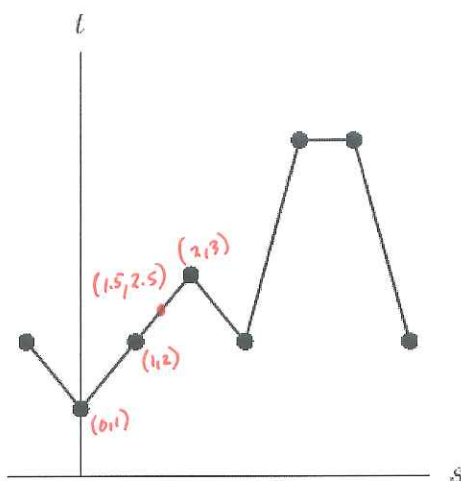
$$\begin{aligned} x+8 &= 1 \\ x &= -7 \end{aligned}$$

2. Given $g(x) = 4x^2 - x$, what is $g(1-x)$?

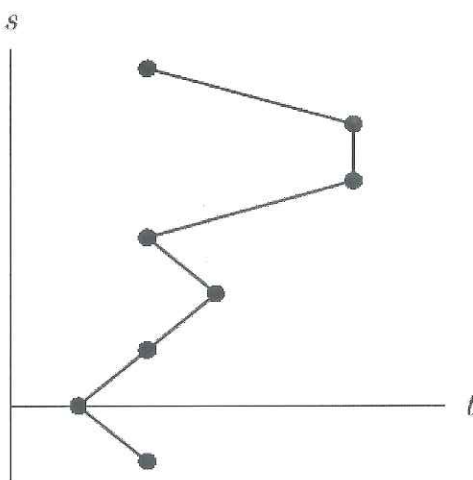
$$\begin{aligned} &4(1-x)^2 - (1-x) \\ &4(1-x)(1-x) - 1 + x \\ &4(1-x-x+x^2) - 1 + x \\ &4(1-2x+x^2) - 1 + x \\ &4 - 8x + 4x^2 - 1 + x \end{aligned}$$

$$4x^2 - 7x + 3$$

3. The data points for the following table are graphed in the figure below.



s	-1	0	1	2	3	4	5	6
t	2	1	2	3	2	5	5	2



For the graph that is a function, approximate $f(1.5)$.

$$2.5$$

4. Suppose that $f(x)$ is linear and that $f(2) = 6$ and $f(3) = 5$. If $f(x) = b + mx$, then $b =$ 8 and $m =$ -1.

$$\begin{aligned} & (2,6) \quad (3,5) \\ & 6 = -1(2) + b \\ & 6 = -2 + b \\ & 8 = b \\ & m = \frac{5-6}{3-2} \\ & = \frac{-1}{1} \\ & m = -1 \end{aligned}$$

5. Assume that height is a function of age and that $H = f(a)$ is the average height (in inches) for females in the US at age a years. What is the practical interpretation of $f(z) + 5$?
- A) z plus the number of US females who are 5 inches tall.
 B) 5 plus the number of US females who are z inches tall.
 C) 5 years older than the average US female who is z inches tall.
 D) 5 inches taller than the average height of a z year old US female.

6. Find the y -coordinate of the point on the graph of $y = h(x) = \frac{1}{\sqrt{x+6}}$ whose x -coordinate is -2 .

$$\begin{aligned} h(-2) &= \frac{1}{\sqrt{-2+6}} \\ &= \frac{1}{\sqrt{4}} \\ &= \frac{1}{2} \end{aligned}$$

$h(-2) = \frac{1}{2}$

7. Let $w(m)$ give the weight (in pounds) of an average-sized baby girl who is m months old. What does it mean if $w(9) = 18$?
- A) 18 baby girls weight 9 pounds.
 B) 9 baby girls weight 18 pounds.
 C) An average 18-month old girl weighs 9 pounds.
 D) An average 9-month old girl weighs 18 pounds.

8. What is the domain of the function $f(x) = \frac{5}{\sqrt{4-x^2}}$?

- A) $-5 < x < 5$
 B) $-5 \leq x \leq 5$
 C) $-2 < x < 2$
 D) $-2 \leq x \leq 2$

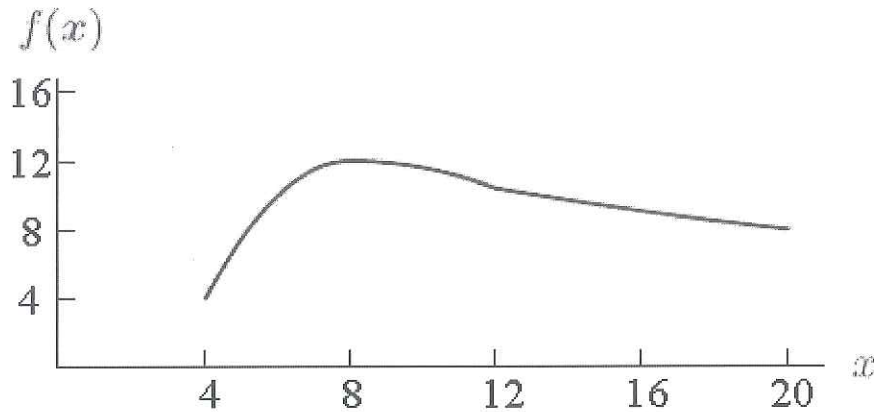
$$\begin{aligned} 4 - x^2 &> 0 \\ 4 &> x^2 \\ x^2 &< 4 \\ -2 &< x < 2 \end{aligned}$$

9. Does the graph of $y = -4x^2 - x$ appear to be concave up, concave down, or neither?



Concave Down

10. Assuming the entire graph of $f(x)$ is shown, what is the domain of $f(x)$?



- A) $4 \leq x \leq 12$
- B) $4 \leq x \leq 20$**
- C) $4 \leq y \leq 12$
- D) $4 \leq y \leq 20$

11. A model rocket is launched from the roof of a building. For height h , in meters, and time t , in seconds, after the rocket is launched, the height of the rocket above the ground is given by $h = f(t) = -4.9t^2 + 47t + 18$. Interpret the domain of the graph of $f(t)$.

- A) The rocket's initial height
- B) The time it takes for the rocket to hit the ground
- C) The heights the rocket reaches
- D) The time the rocket is in the air**
- E) The maximum height obtained by the rocket.

12. Find the domain and range of the function $f(x) = \frac{-6}{\sqrt{x-8}}$

$x-8 > 0$ Domain: All reals $x > 8$
 $x > 8$ Range: All reals $y < 0$
 $y = \frac{-6}{+} \Rightarrow$ Always Negative

13. Let f and g be two invertible functions such that $f^{-1}(x) = (x-3)^3$ and $g(x) = 5x+2$.

Find $f(g^{-1}(4))$. Round your answer to two decimal places, if necessary.

$4 = 5x + 2$
 $2 = 5x$
 $\frac{2}{5} = x$
 $\frac{2}{5} = (x-3)^3$
 $\sqrt[3]{\frac{2}{5}} = x-3$
 $\sqrt[3]{\frac{2}{5}} + 3 = x$
 $3.74 = x$

$g(x) = 5x + 2$
 $x = \frac{y-2}{5}$
 $x-2 = 5y$
 $\frac{1}{5}x - \frac{2}{5} = y$
 $g^{-1}(x) = \frac{1}{5}x - \frac{2}{5}$
 $g^{-1}(4) = \frac{1}{5} \cdot 4 - \frac{2}{5}$
 $= \frac{4}{5} - \frac{2}{5}$
 $= \frac{2}{5}$

$f^{-1}(x) = (x-3)^3$
 $x = (y-3)^3$
 $\sqrt[3]{x} = y-3$
 $\sqrt[3]{x} + 3 = y$
 $f(x) = \sqrt[3]{x} + 3$
 $f(\frac{2}{5}) = \sqrt[3]{\frac{2}{5}} + 3$
 $= 3.74$

Page 3

17. A T-shirt printing company charges a set-up fee of \$10 for each order, plus the cost per shirt shown in the table.

# of shirts	cost per shirt
0-10	\$10
11-20	\$9
21-30	\$8
over 30	\$7

Let C be the total cost in dollars for printing n shirts. Which of the following is the formula for C ?

- (A) $C = \begin{cases} 10+10n, & 0 \leq n \leq 10 \\ 10+9n, & 10 < n \leq 20 \\ 10+8n, & 20 < n \leq 30 \\ 10+7n, & n > 30 \end{cases}$
- B) $C = \begin{cases} 20n, & 0 \leq n \leq 10 \\ 19n, & 10 < n \leq 20 \\ 18n, & 20 < n \leq 30 \\ 17n, & n > 30 \end{cases}$
- C) $C = \begin{cases} 10+10n, & 0 \leq n \leq 10 \\ -80+19n, & 10 < n \leq 20 \\ -240+27n, & 20 < n \leq 30 \\ -450+34n, & n > 30 \end{cases}$
- D) $C = \begin{cases} 10+10n, & 0 \leq n \leq 10 \\ 10+19n, & 10 < n \leq 20 \\ 10+27n, & 20 < n \leq 30 \\ 10+34n, & n > 30 \end{cases}$

18. Fred's cell phone company charges \$50 per month and \$0.25 for each minute (or part of a minute) over 100 minutes. Which of the following is the domain of the function?

- (A) $x \geq 0$
 B) $x \geq 50$
 C) $x \geq 100$
 D) $0 \leq x \leq 100$

19. Let $f(x) = \begin{cases} 3-2x, & -3 \leq x \leq -1 \\ x+4, & -1 < x \leq 3 \\ 11, & 3 < x \leq 5 \end{cases}$. Evaluate:

a) $f(-1) = 5$ $3 - 2(-1)$ $2 + 4$
 b) $f(2) = 6$ $3 + 2$ 6
 c) $f(5) = 11$ 5

20. Use the following table to evaluate $f^{-1}(3)$. = 2

x	0	1	2	3	4
$f(x)$	1	2	3	4	5

21. Calculate successive rates of change for the function $f(x)$ shown in the following table to determine if the graph is more likely concave up or concave down for $0.1 \leq x \leq 0.4$.

x	0.1	0.2	0.3	0.4
$f(x)$	-2.7	-3.1	-3.7	-4.5

-0.4 -0.6 -0.8

*Decreasing Function
Decreasing More Rapidly*

- A) concave up
 B) concave down
 C) neither

22. The circumference, in cm, of a circle whose radius is r cm is given by $C = 2\pi r$. If $C = f(r)$, evaluate and interpret $f^{-1}(14\pi)$.

- A) $28\pi^2$, the circumference of a circle with radius 14π .
 B) $28\pi^2$, the radius of a circle with circumference 14π .
 C) 7, the circumference of a circle with radius 14π .
 D) 7, the radius of a circle with circumference 14π .

$\frac{14\pi = 2\pi r}{2\pi \quad 2\pi}$
 $7 = r$