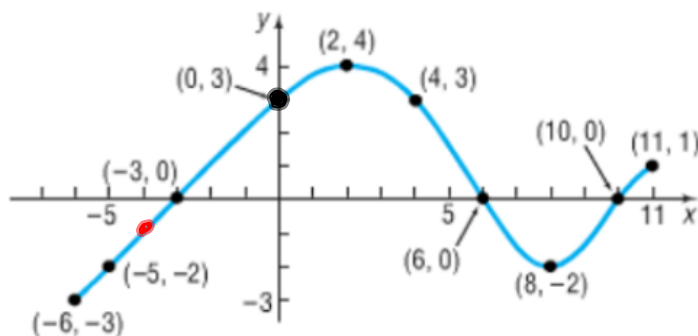


9. Use the given graph of the function f to answer parts (a)–(o).



- (a) Find $f(0)$ and $f(-6)$. $f(0) = 3, f(-6) = -3$
 (b) Find $f(6)$ and $f(11)$. $f(6) = 0, f(11) = 1$ *6 is a zero of f.*
 (c) Is $f(3)$ positive or negative?
 (d) Is $f(-4)$ positive or negative? *Negative*
 (e) For what values of x is $f(x) = 0$? $x = -3, 6, 10$
 (f) For what values of x is $f(x) > 0$? $-3 < x < 6$ or $10 < x \leq 11$
 (g) What is the domain of f ?
 (h) What is the range of f ?
 (i) What are the x -intercepts?
 (j) What is the y -intercept?
 (k) How often does the line $y = \frac{1}{2}$ intersect the graph?
 (l) How often does the line $x = 5$ intersect the graph?
 (m) For what values of x does $f(x) = 3$?
 (n) For what values of x does $f(x) = -2$?
 (o) What are the zeros of f ?

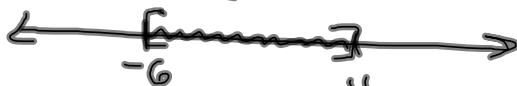
↓ conditions

$$\{x \mid -3 < x < 6 \text{ or } 10 < x \leq 11\}$$

↓ The set of all x such that $f(x) > 0$

$$(-3, 6) \cup (10, 11]$$

$$(g) D = [-6, 11] = \{x \mid -6 \leq x \leq 11\}$$



$$= \{x \mid f(x) \text{ is defined}\}$$

$$(h) R = [-3, 4] = \{y \mid -3 \leq y \leq 4\}$$

$$= \{y \mid y = f(x) \text{ for some } x \in D\}$$

$$(i) x\text{-int: } (-3, 0), (6, 0), (10, 0)$$

$$(j) y\text{-int: } (0, 3)$$

$$(k) y = \frac{1}{2} = f(x) \quad 3 \text{ times}$$

$$(l) x = 5 \text{ intersects the graph once.}$$

$$(m) f(x) = 3 \text{ when } x = 0, 4$$

$$(n) f(x) = -2 \text{ when } x = -5, 8$$

$$(o) f(x) = 0 \text{ when } x = -3, 6, 10$$

24. $f(x) = -3x^2 + 5x$

- Is the point $(-1, 2)$ on the graph of f ?
- If $x = -2$, what is $f(x)$? What point is on the graph of f ?
- If $f(x) = -2$, what is x ? What point(s) are on the graph of f ?
- What is the domain of f ?
- List the x -intercepts, if any, of the graph of f .
- List the y -intercept, if there is one, of the graph of f .
- What are the zeros of f ?

(a) $(x, y) = (-1, 2)$ on it?

$$\begin{aligned} f(-1) &= -3(-1)^2 + 5(-1) \\ &= -3(1) - 5 \\ &= -3 - 5 \\ &= -8 \neq 2 \text{ No.} \end{aligned}$$

$$\begin{aligned} a &= 3, b = -5, c = -2 \Rightarrow \\ b^2 - 4ac &= (-5)^2 - 4(3)(-2) \\ &= 25 + 24 = 49 = 7^2 \\ \downarrow \text{Discriminant} \\ ax^2 + bx + c &= 0 \end{aligned}$$

(b) $x = -2 \Rightarrow f(x) = f(-2)$

$$\begin{aligned} &= -3(-2)^2 + 5(-2) \\ &= -12 - 10 = -22 = f(-2) \end{aligned}$$

(c) $f(x) = -2 \Rightarrow$

$$-3x^2 + 5x = -2$$

$$-3x^2 + 5x + 2 = 0$$

$$3x^2 - 5x - 2 = 0$$

$$(3x+1)(x-2) = 0 \Rightarrow$$

$$3x+1 = 0 \quad \text{OR} \quad x-2 = 0$$

$$3x = -1$$

$$x = -\frac{1}{3}$$

$$\text{OR } x = 2$$

$$x \in \left\{ -\frac{1}{3}, 2 \right\}$$

(d) $D(f) = \mathbb{R} = (-\infty, \infty)$

$\frac{\text{STUFF}}{0}$, $\sqrt{\text{negative}}$
can't divide by zero
Need the radicand ≥ 0 .

~~(e) x -intercepts:~~

~~$(-\frac{1}{3}, 0), (2, 0)$~~

(f) y -int: $(0, f(0))$

$$f(0) = -3(0)^2 + 5(0) = 0$$

$(0, 0)$

(g) The zeros of f are $x = 0, \frac{5}{3}$

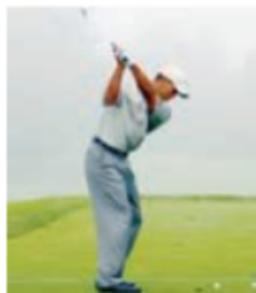
$$\begin{aligned} &\Rightarrow \text{No, Steve, part (c)} \\ &\text{was } f(x) = -2. \text{ we} \\ &\text{want } f(x) = 0 \\ &-3x^2 + 5x = 0 \\ &\Rightarrow x(-3x+5) = 0 \\ &\Rightarrow x=0 \text{ OR } -3x+5=0 \\ &\quad \quad \quad x = \frac{5}{3} \\ &x \in \left\{ 0, \frac{5}{3} \right\} \end{aligned}$$


$(0, 0), \left(\frac{5}{3}, 0\right)$, idiot

- 29. Motion of a Golf Ball** A golf ball is hit with an initial velocity of 130 feet per second at an inclination of 45° to the horizontal. In physics, it is established that the height h of the golf ball is given by the function

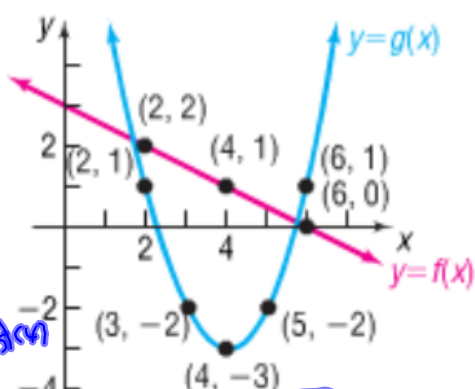
$$h(x) = \frac{-32x^2}{130^2} + x$$

where x is the horizontal distance that the golf ball has traveled.



- (a) Determine the height of the golf ball after it has traveled 100 feet.
- (b) What is the height after it has traveled 300 feet?
- (c) What is the height after it has traveled 500 feet?
- (d) How far was the golf ball hit?
-  (e) Graph the function $h = h(x)$.
- (f) Use a graphing utility to determine the distance that the ball has traveled when the height of the ball is 90 feet.
- (g) Create a TABLE with TblStart = 0 and $\Delta Tbl = 25$. To the nearest 25 feet, how far does the ball travel before it reaches a maximum height? What is the maximum height?
- (h) Adjust the value of ΔTbl until you determine the distance, to within 1 foot, that the ball travels before it reaches a maximum height.

33. The graph of two functions, f and g , is shown below. Use the graph to answer parts (a)–(f).



$$(a) (f+g)(2)$$

$$= f(2) + g(2)$$

$$= 2 + 1 = 3$$

$$(b) (f+g)(4) =$$

$$1 + (-3) = -2 = (f+g)(4)$$

$$(c) (f-g)(6)$$

$$= f(6) - g(6) = 0 - 1 = -1 = (f-g)(6)$$

$$(a) (f+g)(2) \text{ sum}$$

$$(b) (f+g)(4)$$

$$(c) (f-g)(6) \text{ difference}$$

$$(d) (g-f)(6)$$

$$(e) (f \cdot g)(2) \text{ Arithmetic product}$$

$$(f) \left(\frac{f}{g}\right)(4) \text{ quotient}$$

$$(e) (fg)(2) = f(2) \cdot g(2)$$

$$= (2)(1) = 2 = (fg)(2)$$

$$(f) \left(\frac{f}{g}\right)(4) = \frac{f(4)}{g(4)} = \frac{1}{-3} = -\frac{1}{3} = \left(\frac{f}{g}\right)(4)$$