1. Given $f(x)=\begin{cases}-5x-8 & for \quad x<-2\\ \frac{1}{2}x+5 & for \quad -2\le x\le 4\\ 10-2x & for \quad x>4\end{cases}$

a. Graph $f(x)$

b. Find $f(-1)$

2. Given $f(x)=\begin{cases}x^2-2 & if \quad x\le 2\\ 1 & if \quad x>2\end{cases}$ ***find***:

a) $f(-1)$ *b)* $f(2)$ *c)* $f(4)$ *d)* $f(-2)$

3. Given $g(x)=\begin{cases}-|x+2| & if \quad x<-1\\ -2x+3 & if \quad x\ge -1\end{cases}$ ***find***:

a) $f(-1)$ *b)* $f(2)$ *c)* $f(4)$ *d)* $f(-2)$

4. Determine if each function is odd, even, or neither.

a) $g(x)=|x|+4$ *b)* $h(x)=x^4+2x^2-8$ *c)* $f(x)=-x^3+2x$

d) $k(x)=x^2-x+6$ *e)* $f(x)=\dfrac{x-1}{x-2}$

5. Let $f(x)=\sqrt{x+3}$, $g(x)=\dfrac{x+2}{x-1}$ and $h(x)=x-5$ Find the following:

a) Domain f *b)* Domain g *c)* Domain h

d) Domain $\dfrac{f}{h}$ *e)* Domain of $g+f$, $g-f$, *and* $g\cdot f$

f) Domain $\dfrac{g}{f}$ *g)* Domain of $f+h$, $f-h$, *and* $f\cdot h$

6. Let $f(x)=3x+2$ and $g(x)=2x^2-1$. Find the following:

a) $(f\circ g)(4)$ b) $(g\circ f)(2)$ c) $(f\circ g)(x)$ d) $(g\circ f)(x)$

7. Let $f(x)=\sqrt{x+1}$, $g(x)=x^2-3$, and $h(x)=\dfrac{1}{x}$. Find the following functions, and state the domain of each:

a) $(f\circ g)(x)$ *b*) $(g\circ f)(x)$ *c*) $(h\circ f)(x)$

8. Find the difference quotient $\dfrac{f(x+h)-f(x)}{h}$ for

a) $f(x)=4x-5$ *b*) $f(x)=3-4x$ *c*) $f(x)=3x+1$ *d*) $f(x)=2x^2$

9. An airplane is flying at an altitude of 3700 *ft*. The slanted distance directly to the airport is *d* feet. Express the horizontal distance *h* as a function of *d*.

10. Determine the end behavior of the graph of the polynomial function.

a) $f(x)=2x^4-9x^3-5x^2+57x-45$

b) $f(x)=x(x-2)^3(x+2)^2$

c) $f(x)=-4x^5+16x^4+13x^3-76x^2-3x+18$

d) $f(x)=(x-2)^2(x-5)$

e) $f(x)=-(x-2)^2(x-5)^2$

11. Find the quotient and the remainder:

a) $\dfrac{x^3+x^2-11x-10}{x-3}$

b) $\dfrac{3x^3+8x^2+5x+10}{x+2}$

c) $\dfrac{2x^3-x+6}{x+4}$

d) $\left(x^4+3x^3+3x^2+3x+2\right)\div(x+2)$

12. Use the Intermediate Value Theorem to determine whether the function has zeros between ***a*** and ***b***.

a) $f(x)=x^3+3x^2-9x-13;\ \ a=1,\ b=2$

b) $f(x)=4x^2-5x-3;\ \ a=1,\ b=2$

c) $f(x)=x^3-8x^2+x+2;\ \ a=-1,\ b=0$

d) $f(x)=x^3-8x^2+x+2;\ \ a=2,\ b=3$

13. Use synthetic division to find the indicated function value

a) $f(x) = x^3 + 2x^2 - 13x + 10;\ \ f(-2)$

b) $f(x) = x^4 - 16;\ \ f(-2)$

14. Find all solutions of the equation: $x^4 + 9x^3 + 31x^2 + 49x + 30 = 0$

15. Use the Rational Zero theorem to list all possible rational zero for each of the following:

a) $f(x) = x^3 + 3x^2 - 6x - 8$

b) $f(x) = 2x^3 + x^2 - 25x + 12$

c) $f(x) = 3x^4 + 23x^3 + 56x^2 + 52x + 16$

16. Find the ***vertical*** and ***horizontal*** asymptotes (if any) of:

a) $y = \dfrac{x-2}{x^2 - 4x + 3}$

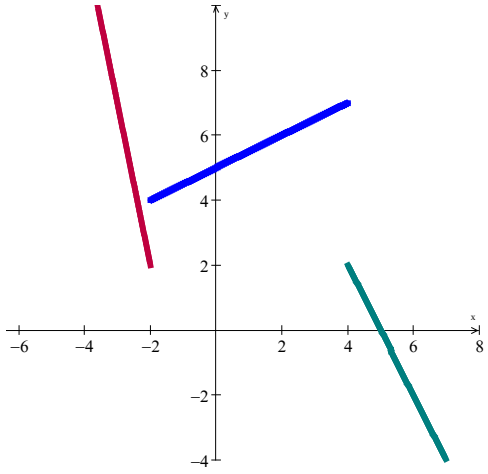
b) $y = \dfrac{(x+2)(x-1)}{x^2 - 3x - 10}$

c) $y = \dfrac{x^3 - 2x^2 - 4x + 8}{x - 2}$

d) $y = \dfrac{-x+1}{-2x^2 + 5x - 3}$

SOLUTION

1. *a*)



b) $f(-1)=\frac{1}{2}(-1)+5=\frac{9}{2}$

2. *a*) -1 *b*) 0 *c*) 1 *d*) 2

3. *a*) 5 *b*) −1 *c*) −5 *d*) 0

4. *a*) even *b*) even *c*) odd *d*) neither *e*) neither

5. *a*) $[-3,\infty)$ *b*) $(-\infty,1)\cup(1,\infty)$ *c*) $(-\infty,\infty)$ *d*) $[-3,1)\cup(1,\infty)$

e) $(-3,1)\cup(1,\infty)$ *f*) $[-3,\infty)$ *g*) $[-3,5)\cup(5,\infty)$

6. *a*) 95 *b*) 127 *c*) $6x^2-1$ *d*) $18x^2+24x+7$

7. *a*) $(f\circ g)(x)=\sqrt{x^2-2}$; $(-\infty,-\sqrt{2})\cup(\sqrt{2},\infty)$

b) $(g\circ f)(x)=x-2$; $(-\infty,\infty)$

c) $(h\circ f)(x)=\frac{1}{\sqrt{x+1}}$; $(-1,\infty)$

8. *a*) 4 *b*) −4 *c*) 3 *d*) $4x+h$

9. $h(t)=\sqrt{d^2-(3700)^2}$

10. *a*) Leading Term: $2x^4$; rises left and right

b) Leading Term: x^6; rises left and right

c) Leading Term: $-4x^5$; rises left and falls right

d) Leading Term: x^3; fall left and rises right

e) Leading Term: $-x^4$; falls left and right

11. *a*) $Q(x) = x^2 + 4x + 1; \quad R(x) = -7$

b) $Q(x) = 3x^2 + 2x + 1; \quad R(x) = 8$

c) $Q(x) = 2x^2 - 8x + 31; \quad R(x) = -118$

d) $Q(x) = x^3 + x^2 + x + 1; \quad R(x) = 0$

12. *a*) Can't be determined
b) Yes
c) Yes
d) Can't be determined

13. *a*) $f(-2) = 36$ *b*) $f(-2) = 0$

14. $-3, \ -2, \ -2, \ \pm i$

15. *a*) $\pm\{1, \ 2, \ 4, \ 8\}$

b) $\pm\left\{1, \ 2, \ 4, \ 6, \ 12, \ \frac{1}{2}, \ \frac{3}{2}\right\}$

c) $\pm\left\{1, \ 2, \ 4, \ 8, \ 16, \ \frac{1}{3}, \ \frac{2}{3}, \ \frac{4}{3}, \ \frac{8}{3}, \ \frac{16}{3}\right\}$

16. *a*) $VA: \ x = 1, \ x = 3; \quad HA: \ y = 0$

b) $VA: \ x = 5; \quad HA: \ y = \frac{4}{3}$

c) $VA: n/a; \quad HA: n/a$

d) $VA: x = \frac{3}{2}; \quad HA: y = 0$