1. Evaluate the following functions at the given values.

   (a) $f(x) = x^2 + 3; \quad f(1), f(3), f(4)$

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

   (c) $f(x) = 3x^3; \quad f(-3), f(0), f(4)$

   (d) $f(x) = 3x^3 - 2x^2; \quad f(1), f(2), f(3)$

   (e) $g(x) = \dfrac{x}{4}; \quad g(0), g(6), g(9)$

   (f) $g(x) = \dfrac{3x+7}{4}; \quad g(-2), g(0), g(8)$

   (g) $h(t) = \dfrac{t}{t+1}; \quad h\left(\dfrac{4}{3}\right), h\left(\dfrac{1}{3}\right), h\left(\dfrac{5}{3}\right)$

   (h) $h(t) = \dfrac{t+1}{t-1}; \quad h\left(\dfrac{3}{2}\right), h\left(\dfrac{1}{2}\right), h\left(\dfrac{1}{4}\right)$

2. Evaluate at the given values.

   (a) $f(x) = \dfrac{1-3x}{2}; \quad f(-2), f(a), f(-a), f(a-1)$

   (b) $f(t) = t + \dfrac{3}{t}; \quad f(3), f(1/3), f(x-1), f\left(\dfrac{1}{x}\right)$

   (c) $f(t) = \sqrt{2+3t}; \quad f(5), f(a), f(x+h)$

   (d) $f(x) = \dfrac{1}{1+x}; \quad f\left(\dfrac{1}{2}\right), f(x+2), f(x+h)$

   (e) $f(x) = 3|x-2|; \quad f(-2), f\left(\dfrac{1}{2}\right), f(x+1), f(x^2+2)$

   (f) $f(x) = \dfrac{1}{x^2}; \quad f\left(\dfrac{1}{2}\right), f(-1), f(x+h)$

   (g) $f(x) = 3; \quad f(2), f\left(\dfrac{1}{2}\right), f(x+h)$

   (h) $f(x) = \dfrac{2}{x^2+1}; \quad f\left(-\dfrac{1}{3}\right), f(a), f(x+h)$

   (i) $f(x) = \dfrac{1}{\sqrt{3x-5}}; \quad f(2), f(z), f(x+h)$

3. Find $\dfrac{f(x+h)-f(x)}{h}$. Simplify as in the videos.

(a) $f(x)=\sqrt{2+3x}$

(b) $f(x)=\dfrac{1}{1+x}$

(c) $f(x)=\dfrac{1}{x^2}$

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

(e) $f(x)=\dfrac{1}{\sqrt{x}}$

(f) $f(x)=\dfrac{1}{\sqrt{3x-5}}$

4. Find the x and y-intercepts of the following functions.

(a) $f(x)=3x+5$

(b) $f(x)=1-2x$

(c) $f(x)=|x-2|$

(d) $f(x)=|2x-3|-1$

(e) $f(x)=x^3-27$

(f) $f(x)=16-x^2$

(g) $f(x)=x^3+125$

(h) $f(x)=x^2-x-2$

(i) $f(x)=x^3-x$

(j) $f(x)=8x-x^4$

(k) $f(x)=x^2-5x-14$

(l) $f(x)=8-x^2$

Answers

1. (a) $4, 12, 19$ (b) $-3, 13, 27$ (c) $-81, 0, 192$ (d) $1, 16, 63$

   (e) $0, \frac{3}{2}, \frac{9}{4}$ (f) $\frac{1}{4}, \frac{7}{4}, \frac{31}{4}$ (g) $\frac{4}{7}, \frac{1}{4}, \frac{5}{8}$ (h) $5, -3, -\frac{5}{3}$

2. (a) $\frac{7}{2}, \frac{1-3a}{2}, \frac{1+3a}{2}, \frac{4-3a}{2}$

   (b) $4, \frac{28}{3}, \frac{x^2-2x+4}{x-1}, \frac{1+3x^2}{x}$

   (c) $\sqrt{17}, \sqrt{2+3a}, \sqrt{2+3(x+h)}$

   (d) $\frac{2}{3}, \frac{1}{x+3}, \frac{1}{1+x+h}$

   (e) $12, \frac{9}{2}, 3|x-1|, 3x^2$

   (f) $4, 1, \frac{1}{(x+h)^2}$

   (g) $3, 3, 3$

   (h) $\frac{9}{5}, \frac{2}{a^2+1}, \frac{2}{(x+h)^2+1}$

   (i) $1, \frac{1}{\sqrt{3z-5}}, \frac{1}{\sqrt{3(x+h)-5}}$

3. (a) $\frac{3}{\sqrt{2+3(x+h)}+\sqrt{2+3x}}$

   (b) $\frac{-1}{(1+x)(1+x+h)}$

   (c) $\frac{-(2x+h)}{x^2(x+h)^2}$

   (d) $\frac{-4x-2h}{((x+h)^2+1)(x^2+1)}$

   (e) $\frac{-1}{\sqrt{x(x+h)}(\sqrt{x}+\sqrt{x+h})}$

   (f) $\frac{-3}{\sqrt{(3x-5)(3(x+h)-5)}(\sqrt{3x-5}+\sqrt{3(x+h)-5})}$

4. (a) x-intercept: $-5/3$, y-intercept: 5

   (b) x-intercept: $1/2$, y-intercept: 1

   (c) x-intercept: 2, y-intercept: 2

   (d) x-intercepts: $1, 2$, y-intercept: 2

   (e) x-intercept: 3, y-intercept: -27

   (f) x-intercepts: $-4, 4$, y-intercept: 16

   (g) x-intercept: -5, y-intercept: 125

   (h) x-intercepts: $-1, 2$, y-intercept: -2

   (i) x-intercepts: $-1, 0, 1$, y-intercept: 0

   (j) x-intercepts: $0, 2$, y-intercept: 0

   (k) x-intercepts: $-2, 7$, y-intercept: -14

   (l) x-intercepts: $-2\sqrt{2}, 2\sqrt{2}$, y-intercept: 8