1. Sketch the graph of the given piecewise-defined function.

(a) $f(x) = \begin{cases} 4-x & \text{if} \quad x \le 3 \\ 2 & \text{if} \quad x > 3 \end{cases}$

(b) $f(x) = \begin{cases} x^2 & \text{if} \quad x \le 0 \\ 2x & \text{if} \quad x > 0 \end{cases}$

(c) $f(x) = \begin{cases} -3 & \text{if} \quad x < 0 \\ 2x-3 & \text{if} \quad 0 < x < 3 \\ 3 & \text{if} \quad x > 3 \end{cases}$

(d) $f(x) = \begin{cases} x^2-4 & \text{if} \quad x \le -2 \\ 4-x^2 & \text{if} \quad -2 < x < 2 \\ x^2-4 & \text{if} \quad x \ge 2 \end{cases}$

(e) $f(x) = \begin{cases} -2x-4 & \text{if} \quad x < -2 \\ \frac{1}{2}x & \text{if} \quad x \ge -2 \end{cases}$

(f) $f(x) = \begin{cases} x^2 & \text{if} \quad x \le -2 \\ 3-x & \text{if} \quad -2 < x < 2 \\ 4 & \text{if} \quad x \ge 2 \end{cases}$

2. For each of the functions below, calculate $f(-1), f(0)$, and $f(1)$.

(a) $f(x) = \begin{cases} -10x+6 & \text{if} \quad x \le -1 \\ 4x-2 & \text{if} \quad -1 < x < 1 \\ 6 & \text{if} \quad x \ge 1 \end{cases}$

(b) $f(x) = \begin{cases} 2x & \text{if} \quad x < -1 \\ -5x+5 & \text{if} \quad -1 < x \le 1 \\ -3x^2-6x-5 & \text{if} \quad x > 1 \end{cases}$

(c) $f(x) = \begin{cases} x^2+7x+8 & \text{if} \quad x < -1 \\ \sqrt{x+8} & \text{if} \quad -1 \le x < 1 \\ x^2+x-9 & \text{if} \quad x \ge 1 \end{cases}$

(d) $f(x) = \begin{cases} \sqrt{-7x+2} & \text{if} \quad x \le -1 \\ 8 & \text{if} \quad -1 < x \le 1 \\ -2x^2-7 & \text{if} \quad x > 1 \end{cases}$

(e) $f(x) = \begin{cases} \sqrt[3]{x} & \text{if} \quad x \le -1 \\ x^2+3x & \text{if} \quad -1 < x \le 0 \\ 15 & \text{if} \quad x > 0 \end{cases}$

(f) $f(x) = \begin{cases} \dfrac{x^2-x}{x^2-1} & \text{if} \quad x \ne 1 \\ 1 & \text{if} \quad x = 1 \end{cases}$

(g) $f(x) = \begin{cases} \pi & \text{if} \quad x < 1 \\ x^{4/5}(x-4)^2 & \text{if} \quad x \ge 1 \end{cases}$

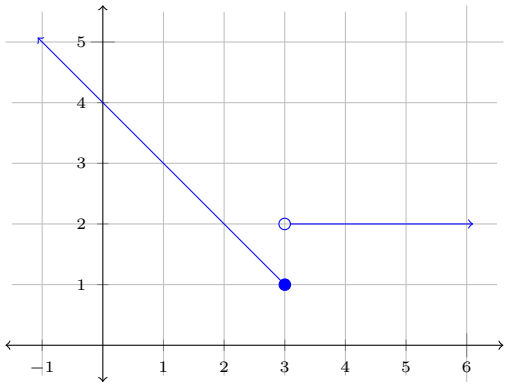
(h) $f(x) = \begin{cases} x+\dfrac{1}{x} & \text{if} \quad x < 0 \\ x^{1/5}-x^{-2/5} & \text{if} \quad 0 \le x < 2 \\ \dfrac{x}{x-1} & \text{if} \quad x \ge 2 \end{cases}$

(i) $f(x) = \begin{cases} x^3+1 & \text{if} \quad x \le -1 \\ \sqrt{x+3} & \text{if} \quad -1 < x < 3 \\ x+3 & \text{if} \quad x \ge 3 \end{cases}$

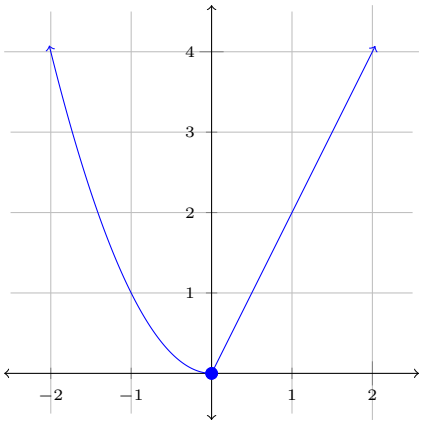
(j) $f(x) = \begin{cases} -8 & \text{if} \quad x \ne 0 \\ 4 & \text{if} \quad x = 0 \end{cases}$

Answers

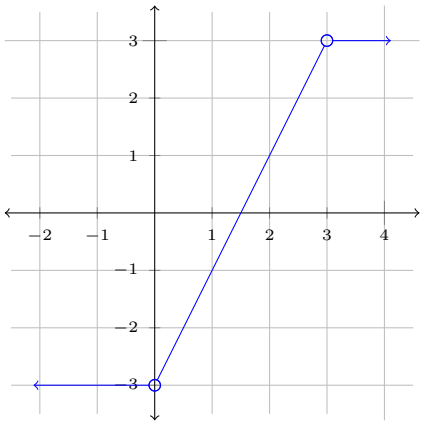
1. (a)



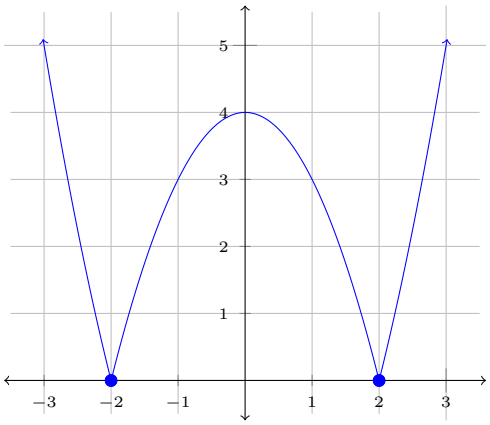
(b)



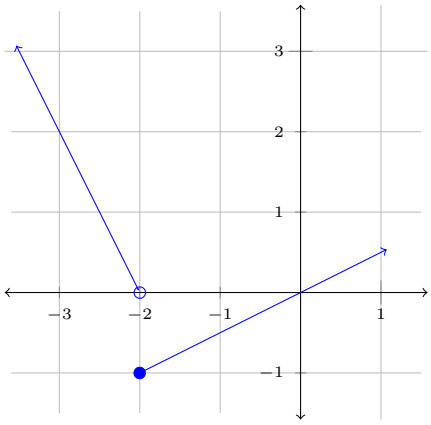
(c)



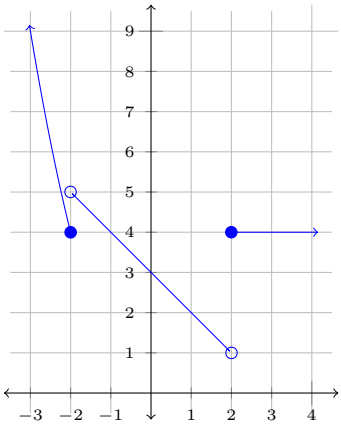
(d)



(e)



(f)



2. (a) $16, -2, 6$ (b) undefined, $5, 0$ (c) $\sqrt{7}, \sqrt{8}, -7$ (d) $3, 8, 8$

(e) $-1, 0, 15$ (f) undefined, 0, 1 (g) $\pi, \pi, 9$ (h) $-2, 0, 0$

(i) $0, \sqrt{3}, 2$ (j) $-8, 4, -8$