

1. Solve the following. Show your answer graphically and using interval notation.

(a) $x^2 - 3x < -2$

(b) $x^2 + 1 > 2x$

(c) $6x^3 + x - 1 \geq 0$

(d) $x^2 + x + 1 \leq 0$

(e) $|x - 2| > 1$

(f) $|2x - 1| < 2x - 3$

(g) $|x - 1| > |x + 1|$

(h) $\left| \frac{x+2}{x+3} \right| > x$

(i) $|x^2 + 2x - 3| > 5$

(j) $\frac{4x^2-1}{x+1} \geq 0$

(k) $\frac{x^3-1}{x-1} < 3$

(l) $\frac{x+3}{4-x} < 2$

(m) $x^3 + 3x^3 + 3x + 1 > 8$

2. Simplify the following expressions.

(a) $\frac{x^2+2x+1}{3x+3}$

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

(c) $\frac{x+2}{2x^2+5x+2} - \frac{x^2}{x^2+4x}$

(d) $\frac{1}{3x-1} + \frac{1}{3x+1} - \frac{6x}{9x^2-1}$

3. Solve the following equations.

(a) $x + \frac{2}{x} = -3$

(b) $\frac{1}{y+1} - \frac{2y+3}{y^2+2y+1} = 0$

(c) $\frac{1}{z} = \frac{17}{z^5+z}$

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

4. Solve the following. Show your answer graphically and using interval notation.

(a) $\frac{1}{x} + \frac{1}{x^2} > 0$

(b) $\frac{x+2}{x+1} < \frac{7x+28}{x^2+5x+4}$

(c) $0 < \frac{1}{z^2+2} + \frac{5}{z+1}$

(d) $\frac{1}{x+2} - \frac{x}{7x+1} > -1$

(e) $\frac{x^2+x-6}{x^4-16} \geq \frac{1}{x^2+4}$