

I. Simplify the following expressions. (Assume all variables are positive.)

1.  $\frac{x+3}{\sqrt{3}-x}$
2.  $\frac{9^{1/3}(\sqrt[5]{a^2} \cdot \sqrt[7]{b})^3 a^2}{9^{-1/6} b^{1/2}}$

II. Find the solution set.

1.  $2x^2 + 11|x| = 21$
2.  $(x^2 - 4x)^2 + 60 = 17(x^2 - 4x)$
3.  $\sqrt{3x^2 + 6x} - 1 = 2x$
4.  $3 - |2x - 1| = 5x$
5.  $\frac{x}{2x+3} \geq \frac{x+1}{2x+3} + x$

III. Do as indicated.

1. Find the equation of the perpendicular bisector of the line segment  $P(-3, 1)$  and  $Q(2, 0)$ .
2. Find the center-radius form of the circle whose diameter has endpoints  $P(1, -1)$  and  $Q(-3, 2)$ .
3. Find all values of  $k$  such that  $f(x) = (2k+1)x^2 + (k+2)x + 1$  intersects the  $x$ -axis at most once.
4. Let  $f(x) = \sqrt{x+1}$  and  $g(x) = \frac{1}{x^4-1}$ .
  - (a) Find  $(g \circ f)(x)$ .
  - (b) Find  $\text{dom}(g \circ f)$ .
5. Let  $f(x) = 5x - 2x^2 + 3$ .
  - (a) Find the intercepts of  $f$ .
  - (b) Find the vertex of  $f$ .
  - (c) Graph  $f$  and properly label its intercepts and vertex.