

Solve each polynomial equation by factoring and then using the zero-product principle.

1. $3x^4 - 48x^2 = 0$

2. $2x - 3 = 8x^3 - 12x^2$

3. $2x^4 = 16x$

Solve each radical equation. Be sure to check all proposed solutions and eliminate any that do not work.

4. $\sqrt{3x + 18} = x$

5. $\sqrt{x + 3} = x - 3$

6. $x - \sqrt{2x + 5} = 5$

7. $\sqrt{x+8} - \sqrt{x-4} = 2$

Solve each equation with rational exponents. Be sure to check all proposed solutions and eliminate those that do not work.

8. $x^{\frac{3}{2}} = 8$

9. $(x-4)^{\frac{2}{3}} = 16$

Solve each equation making an appropriate substitution.

10. $x^4 - 5x^2 + 4 = 0$

11. $x - 13\sqrt{x} + 40 = 0$

12. $x^{\frac{2}{3}} - x^{\frac{1}{3}} - 6 = 0$