

Math 110 Review

1. Solve each system of equations by graphing. State the solution set, and say whether each system is dependent, independent, or inconsistent.

(a) $x + 2y = 4$
 $y = -\frac{1}{2}x + 2$

(b) $x = y + 5$
 $2x - 2y = 12$

2. Solve each system of equations algebraically, using either the addition method or the substitution method. State the solution set, and classify the system as dependent, independent, or inconsistent.

(a) $y = 3x + 11$
 $2x + 3y = 0$

(d) $2(y - 5) + 4 = 3(x - 6)$
 $3x - 2y = 12$

(b) $x - y = 3$
 $3x - 2y = 3$

(e) $x = y + 5$
 $2x - 2y = 7$

(c) $5x - 3y = -20$
 $3x + 2y = 7$

(f) $\frac{1}{4}x + \frac{3}{8}y = \frac{3}{8}$
 $\frac{5}{2}x - 6y = 7$

3. Solve by factoring, using the even root property, or completing the square. Check that the quadratic formula gives the same solution set.

(a) $(x - 8)(x + 4) = -42$

(c) $25 - \frac{1}{3}x^2 = 0$

(b) $2y^2 - 3y - 6 = 0$

(d) $x^2 + 10x - 3 = 0$

4. Solve each equation. Check for extraneous solutions where appropriate.

(a) $\frac{1}{x} - \frac{2}{1-x} = \frac{1}{2}$

(e) $(w + 3)^{-1/3} = \frac{1}{3}$

(b) $y - 1 = \frac{\sqrt{y+1}}{2}$

(f) $\frac{1}{2}x^3 + 4 = 0$

(c) $\sqrt{2x} - \sqrt{2x-12} = 6$

(g) $\sqrt[4]{4x^4 - 48} = -x$

(d) $\sqrt{x^2 - x - 4} = 4$

(h) $(a - 1)^{-3} = -3$

5. Simplify each expression. All denominators should be rationalized, all radicals should be simplified, all complex numbers should be written in the form $a + bi$, and all exponents should be positive.

(a) $\frac{4 - \sqrt{-12}}{2}$

(f) $\frac{\sqrt{6}}{1 - \sqrt{3}}$

(b) $(2 + 3i)(5 - 2i)$

(g) $\frac{(x^2y^{-3}z)^{1/2}}{x^{1/2}yz^{-1/2}}$

(c) $\sqrt[3]{\frac{2}{3}}$

(h) $(t^{-1/2}v)^{-2}(t^{-2}v^3)$

(d) $(-2\sqrt{x})^5$

(i) $\sqrt{\frac{12a^3}{25}}$

(e) $\frac{-\sqrt{xy}}{3\sqrt{x} + \sqrt{xy}}$

(j) $\left(\frac{1}{3} + \frac{1}{4}\right)^{-2}$

6. Perform the indicated operations. Remember to simplify fractions before finding LCDs when adding/subtracting, and to cancel before multiplying.

(a) $\frac{6y}{2y^2 + 4y + 2} - \frac{3y - 3}{y^2 - 1}$

(c) $\frac{x^2 - 1}{x^2 + 2x + 1} \cdot \frac{x^3 + 1}{2x - 2}$

(b) $\frac{b - a}{7} \div \frac{a^2 - 2ab + b^2}{14}$

(d) $\frac{a + 4}{a^3 - 8} - \frac{3}{2 - a}$

7. Rewrite each expression in the form quotient + remainder/divisor. Use synthetic division when dividing by $x - a$, otherwise use long division.

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

(b) $\frac{x^4 + x^3 + 5x^2 + 2x + 6}{x^2 + 2}$

8. Simplify each complex fraction.

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

(b) $\frac{x^{-3}y^2 - x^{-2}y}{xy^{-2} + x^2y^{-1}}$

9. Solve each inequality. State the solution set using interval notation and graph it.

(a) $a^2 + a > 6$

(d) $x^3 + 5x^2 - 4x - 20 \geq 0$

(b) $x - x^2 \leq 0$

(e) $16x^2 - 16x + 4 > 0$

(c) $t^2 < 3(2t - 3)$

(f) $2x^2 - 8x + 3 < 0$