

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) Solution set: $\{(x, y) \mid x + 2y = 4\}$ (b) Solution set: \emptyset

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

(a) Solution set: $\{(-3, -2)\}$ (d) Solution set: $\{(x, y) \mid 3x - 2y = 12\}$

(b) Solution set: $\{(-3, -6)\}$ (e) Solution set: \emptyset

(c) Solution set: $\{(-1, 5)\}$ (f) Solution set: $\{2, -\frac{1}{3}\}$

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

(a) $\{2 \pm \sqrt{6}i\}$ (c) $\{\pm 5\sqrt{3}\}$

(b) $\left\{\frac{3 \pm \sqrt{57}}{4}\right\}$ (d) $\{-5 \pm 2\sqrt{7}\}$

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

(a) $\left\{\frac{7 \pm \sqrt{41}}{2}\right\}$ (e) $\{24\}$

(b) $\left\{\frac{9 + \sqrt{33}}{8}\right\}$ (f) $\{-2\}$

(c) \emptyset (g) $\{-2\}$

(d) $\{-4, 5\}$ (h) $\left\{1 - \frac{\sqrt[3]{9}}{3}\right\}$

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) $2 - i\sqrt{3}$

(b) $16 + 11i$

(c) $\frac{\sqrt[3]{18}}{3}$

(d) $-32x^2\sqrt{x}$

(e) $\frac{y - 3\sqrt{y}}{9 - y}$

(f) $-\frac{\sqrt{6} + 3\sqrt{2}}{2}$

(g) $\frac{x^{1/2}z}{y^{5/2}}$

(h) $\frac{v}{t}$

(i) $\frac{2a\sqrt{3}}{5}$

(j) $\frac{49}{144}$

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

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

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

(b) $\frac{-2}{a - b}$

(d) $\frac{3a^2 + 7a + 10}{a^3 - 8}$

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

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

(b) $x^2 + x + 3$ (No remainder)

8. Simplify each complex fraction.

(a) $\frac{5x + 1}{-x - 5}$

(b) $\frac{y^4 - xy^3}{x^4 + x^5y}$

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

(a) $(-\infty, -3) \cup (2, \infty)$

(e) $\left(-\infty, \frac{1}{2}\right) \cup \left(\frac{1}{2}, \infty\right)$

(b) $(-\infty, 0] \cup [1, \infty)$

(c) \emptyset

(f) $\left(\frac{4 - \sqrt{10}}{2}, \frac{4 + \sqrt{10}}{2}\right)$

(d) $[-5, -2] \cup [2, \infty)$