

First Review for Math 06 Fall 2009

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Please note: You should fully justify your answers.

1. Perform the following operations. Simplify your answers as much as possible (but no more).

(a) $\frac{5z - 12}{z^2 - 8z + 15} - \frac{3z - 2}{z - 3} + \frac{3}{z - 5}$

(b) $\frac{2x^2 + x}{2x^2 - 5x - 3} \cdot \frac{x - 3}{x} \cdot \frac{x^2 - 9}{x^2 + 2x - 3}$

(c) $\frac{\frac{ab}{a - b}}{\frac{b}{b - a}}$

(d) $\frac{\frac{x - 4}{4} + \frac{1}{x + 2}}{\frac{x - 4}{x - 4} - \frac{1}{x + 2}}$

2. Solve:

(a) $\frac{s}{2} - \frac{2}{s} = \frac{3s}{8}$

(b) $\frac{x + 1}{x - 2} - \frac{x + 3}{x} = \frac{6}{x^2 - 2x}$

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

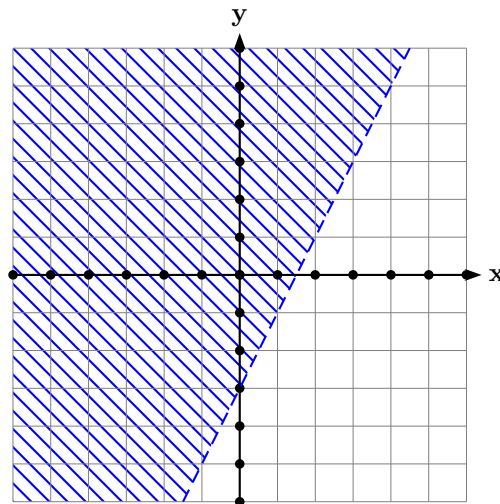
(d) $\frac{3x + 2}{3} = \frac{5x - 2}{5} + 4$

(e) $\frac{x + 8}{x + 3} + 2 = -\frac{3x + 4}{10}$

3. Determine the value of the real number a , if $x = 2$ is *not* a solution of the equation:

$$\frac{x - 2}{ax^2 + 3x - 10} = 0$$

4. Write an inequality that describes the shaded region in the graph below:



5. Graph each of the following inequalities in the same grid:

- (a) $3x + 2y < 5$
- (b) $2x - y \geq 1$
- (c) $-x + y > -2$

6. Sketch the graph of $y = |2x - 3|$. Be sure to indicate clearly the critical point, the axis of symmetry and at least one point on either side of the axis of symmetry.

7. Solve algebraically:

- (a) $|2x - 5| \geq 7$
- (b) $|2x + 6| < 8$
- (c) $|3x - 1| > -2$
- (d) $|4x - 31| \leq -1$

8. Simplify each of the following radical expressions:

- (a) $\sqrt{75} - 5\sqrt{12} + 3\sqrt{27}$
- (b) $(1 - \sqrt{3})(2 + \sqrt{6})$
- (c) $\frac{1 - \sqrt{10}}{\sqrt{6} + \sqrt{15}}$

9. Evaluate

$$\frac{x^2 - y^2}{\sqrt{5}}$$

if $x = 1 + \sqrt{5}$ and $y = 1 - \sqrt{5}$

10. Find b if $x = 1 + \sqrt{7}$ is a solution to the equation:

$$x^2 + bx - 6 = 0$$

11. Solve:

$$\sqrt{15 - 2x} = x$$

12. Solve:

$$\sqrt{7x + 1} = 3x + 1$$

13. Solve:

$$\sqrt{30 - 10x} + 3 = x$$

14. Solve:

$$\sqrt{x + 3} - \sqrt{3x + 7} = -2$$

15. Solve:

$$\sqrt{\sqrt{x + 1} + 1} = \sqrt{x - 4}$$

16. Perform the following operations. Give your answer in the form $a + bi$ with a and b real numbers.

- (a) $(2 - 3i)(-5 + 4i)$
- (b) $\frac{(3 - 4i)(-1 + 2i)}{2 - i}$
- (c) $\frac{-1 - i}{2 - 3i}$
- (d) $(2 - i)^3$

17. Evaluate each of the following expressions when $z = -2 + 3i$:
- (a) $z^2 + 4z$
 - (b) $\frac{3 + 2i}{iz}$
18. Solve the following equations using the quadratic formula:
- (a) $x^2 + 8x + 15 = 0$
 - (b) $x^2 - 4x + 7 = 0$
 - (c) $x^2 + 17 = 0$
 - (d) $x^2 - 3x = 5$
 - (e) $2x^2 - 11x + 15 = 0$
 - (f) $3x^2 + 5x - 12 = 0$
 - (g) $10x^2 - 17x = -33$
19. Factor each of the following quadratic trinomials using the quadratic formula:
- (a) $x^2 - 4$
 - (b) $2x^2 + 50$
 - (c) $7x^2 - 3x$
 - (d) $x^2 - 5x + 6$
 - (e) $6x^2 + x - 1$
 - (f) $x^2 + 2x - 2$
 - (g) $x^2 - 4x + 1$
 - (h) $4x^2 - 8x + 13$
20. Find a quadratic equation with real coefficients that has $2 + 3i$ and $2 - 3i$ as solutions.
21. Can you find a quadratic equation with real coefficients that has $1 - i$ and $2 + i$ as solutions?
22. The quadratic equation $x^2 + bx + 5 = 0$ has a double solution. Find b .