

1. [4 points] Evaluate. Write your answer as a fraction in simplest form.

$$27^{-\frac{2}{3}}$$

2. [4 points] Combine the radical expressions, if possible.

$$2\sqrt{75} + \sqrt{12}$$

3. [4 points each] Perform the following operations and write the results in standard form.

a. $(3 + 2i) - (7 - i)$

b. $(5 + 2i)(3 - 7i)$

4. [5 points each] Simplify the following expressions. Use absolute value symbols when necessary.

a. $\sqrt{32x^2}$

b. $\sqrt[3]{8a^3b^6c^4}$

5. [5 points] Multiply and simplify.

$$(4\sqrt{3x} + \sqrt{6})^2$$

6. [5 points] Rationalize the denominator and simplify.

$$\frac{2}{\sqrt{6}-3}$$

7. [6 points each] Find all real and complex solutions to the following equations. Give the exact solutions.

a. $\sqrt[3]{3x+7} - 6 = 0$

b. $\frac{x}{5} = \frac{2x}{x+1}$

8. [4 points] Rewrite the expression using rational exponents and simplify.

$$\sqrt{x} \cdot \sqrt[3]{x^2}$$

9. [6 points each] Find all real and complex solutions to the following equations. Give the exact solutions.

a. $(x-5)^2 = -36$

b. $\sqrt{x+7} = x+1$

c. $\frac{8}{x+2} - \frac{7}{x+7} = \frac{6}{x^2+9x+14}$

10. [6 points] Solve the equation using the quadratic formula. Give the exact solutions.

$$5x^2 - 2x - 1 = 0$$

11. [6 points] Solve the equation by completing the square. Give the exact solutions.

$$2x^2 + 8x - 6 = 0$$

12. [6 points] Solve the equation of quadratic form.

$$x^{\frac{2}{3}} - 3x^{\frac{1}{3}} - 4 = 0$$

13. [6 points] The illumination provided by a car's headlight varies inversely as the square of the distance from the headlight. A car's headlight produces an illumination of 3.75 footcandles at a distance of 40 feet. What is the illumination when the distance is 50 feet?
14. [6 points] A supporting wire is to be attached to the top of a 50-foot antenna. If the wire must be anchored 50 feet from the base of the antenna, what is the length of the wire required? Write your answer to the nearest inch.

The following problems are extra credit.

1. [5 points] Rationalize the denominator and simplify.

$$\frac{6x}{\sqrt[3]{3x}}$$

2. [5 points] It takes 4 hours to fill a pool using 2 hoses with different diameters. It takes 6.5 hours to fill the pool using only the hose with the larger diameter. How long does it take to fill the pool using only the hose with the smaller diameter? Write your answer to the nearest minute.

Answers for Math 103 Practice Test 3 (Winter 2015, Form 1)

1. $\frac{1}{9}$

EC1. $2\sqrt[3]{9x^2}$

2. $12\sqrt{3}$

EC2. *624 minutes*

3a. $-4 + 3i$

3b. $29 - 29i$

4a. $4|x|\sqrt{2}$

4b. $2ab^2c\sqrt[3]{c}$

5. $48x + 24\sqrt{2x} + 6$

6. $-\frac{2\sqrt{6}+6}{3}$

7a. $x = \frac{209}{3}$

7b. $x = 0$ or 9

8. $x^{7/6}$

9a. $x = 5 \pm 6i$

9b. $x = 2$

9c. $x = -36$

10. $\frac{1}{5} \pm \frac{\sqrt{6}}{5}$

11. $x = -2 \pm \sqrt{6}$

12. $x = -1$ or 64

13. $I = \frac{6000}{d^2}; I = 2.4$ ft candles

14. *849 inches*