

Math 111 Exam 1 Review Problems

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Problem 1. Perform the operations and express your answer in simplest form with positive exponents only:

- (a) $x^{-5} \left(\frac{4x^{-2}y^3}{3x^{-5}} \right)^{-2}$
- (b) $2y^3 \left(\frac{12x^3y^{-2}}{3x^{-5}y^4} \right)^{1/3}$
- (c) $\frac{3(1+x)^{1/2} - x(1+x)^{-1/2}}{1+x}$

Problem 2. Perform the operations and express your answer in simplest form.

- (a) $\frac{x-5}{x^2-2x-8} - \frac{x+1}{x+2}$
- (b) $\frac{x-4}{3x^3-27x} - \frac{2x+1}{x-3}$

Problem 3. Express the following as a simple fraction reduced to lowest terms:

$$\frac{1 - \frac{4}{z} + \frac{4}{z^2}}{\frac{1}{z^2} - \frac{2}{z^3}}$$

Problem 4. Solve for y in the equation:

$$\frac{1}{y} + \frac{1}{x} = \frac{1}{z}$$

Problem 5. Simplify the radical: (LEAVE IN RADICAL FORM)

- (a) $\sqrt[3]{54x^5y^9z^4}$
- (b) $\sqrt{24x^3y^2z^5} \sqrt{12xyz^2}$
- (c) $\sqrt[3]{x^2} \sqrt{x}$

Problem 6. Rationalize the denominator and simplify:

- (a) $\frac{8x}{\sqrt[3]{2xy^2}}$
- (b) $\frac{6}{\sqrt{10} - \sqrt{7}}$
- (c) $\frac{x-3}{\sqrt{x} - \sqrt{3}}$
- (d) $\frac{3h}{\sqrt{x-h} - \sqrt{h}}$

Problem 7. Let $A = (3, 1)$, $B = (-1, 5)$, $C = (4, 5)$, and $D = (2, 7)$ be points (on the xy -coordinate). Suppose M is the midpoint of AB , and N the midpoint of CD .

- (a) Find the distance between M and N .
- (b) What is the equation of the circle having the center M and radius 5?
- (c) What is the equation of a circle having a center of A , and containing the point B ?
- (d) What is the equation of a circle with diameter having endpoints C and D ?

Problem 8. Solve the inequality, and graph the solution on the number line:

- (a) $|3x - 2| < 7$
- (b) $|3x - 4| \geq 3$

Problem 9. Solve the inequality and leave your answer in interval form.

- (a) $\frac{x+2}{x+3} < \frac{x-1}{x-2}$
- (b) $\frac{x}{2} - \frac{5}{x+1} \geq 4$

Problem 10. Solve the following equation for x :

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

Problem 11. Anthony leaves Kingstown at 2:00 pm and drives to Queensville, a 160 mile distance, at 45 mi/h. At 2:15 pm Helen leaves Queensville and drives Kingstown at 40mi/h. At what time do they pass each other on the road?