

Math 111 Exam 1

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Problem 1. Simplify the following expressions. Express the final answers with positive exponents.

(a) $\left(\frac{3x^2}{5yz^3}\right)^{-2} \left(\frac{xy^2}{5z}\right)$ (5 points.)

(b) $(3y - x^2)^2$ (5 points.)

Problem 2. Express the following in simplest **radical** form.

(a) $\sqrt[3]{\frac{54x^7}{2y^6z^4}}$ (5 points.)

(b) $(\sqrt[3]{5} - 1)(\sqrt[3]{5^2} + \sqrt[3]{5} + 1)$ (5 points.)

Problem 3. Use the method of **completing the square** to solve the following quadratic equation (10 points.)

$$2x^2 = 5x + 3$$

Problem 4. Solve each of the following equations for x .

(a) $\sqrt{5 - x} = x - 3$ (10 points.)

(b) $\frac{2xy - 3}{x - 3y} = 7y^2$ (6 points.)

Problem 5. Simplify the following expression. (10 points.)

$$\frac{2}{x - 1} - \frac{1}{x^2 - 1} + 1$$

Problem 6. Mary drove from Amity to Belleville at a speed of 50 mi/h. On the way back, she drove at 60 mi/h. The total trip took $4\frac{2}{5}$ hours of driving time. **Find the distance between the two cities.** (10 points.)

Problem 7. Solve the following inequalities and leave your answer in both interval and graph forms.

(a) $\left|\frac{2x}{3} - 4\right| \geq 2$ (8 points.)

(b) $\frac{2x}{2x - 3} \geq 2$ (10 points.)

Problem 8. (a) If $A = (2, 4)$ and $M = (1/2, 6)$, find the coordinates of the point $B = (x, y)$ such that M is the midpoint of the line segment AB (4 points.)

(b) Find an equation of the circle for which the line segment AB is a diameter. (6 points.)

(c) Find the center and the radius of the circle given by the equation (6 points.)

$$x^2 + y^2 - 6x + 10y + 25 = 0$$

Problem 9. (Extra credit) Simplify the following expression. (5 points)

$$1 + \frac{1}{1 + \frac{1}{1+x}}$$