

Instructions: This is a practice test. It is by no means comprehensive, as the test may include situations that practice test does not address. With that said, your WeBWork and especially the final exam review should give you a good idea of what to expect on your tests. You should write all answers in **simplest rational or radical form**. All imaginary/complex solutions should be written in $a + bi$ form. No decimal answers will be accepted, except for questions 10.1 and 11. You will be granted a scientific, but **NO GRAPHING CALCULATORS** Your test will be on Monday, May 5, 2025

Problem 1 (10 points)

1. Evaluate the following expression and justify your answer.

$$(3 + 6)^{\frac{1}{2}} + (12 - 4)^{\frac{2}{3}} - (23)^0 + \left(\frac{1}{5}\right)^{-2}$$

2. Perform the indicated operation and express your answer in $a + bi$ form.

$$\frac{3 - 4i}{5 + 2i}$$

Problem 2 (10 points)

Solve the following equations and simplify their answers.

1. $3(4x + 7) - (x - 6) = -5x - 5$
2. $4x^2 - x = -3$

Problem 3 (10 points)

1. Simplify the Complex Fraction

$$\frac{12 - \frac{7}{2y}}{\frac{7}{8y} - 3}$$

2. Simplify

$$\frac{5x^5 - 45x^4 - 110x^3}{10x^2 - 40}$$

Problem 4 (10 points)

Solve the following Equation.

$$\frac{24}{x^2 - 2x - 15} = \frac{4x}{x - 5} - \frac{3}{x + 3}$$

Problem 5 (10 points)

1. Assuming the variables only take on positive values, simplify and write your answer as a simple fraction using only positive exponents with each variable appearing at most once.

$$\left(\frac{4x^3y^{-2}}{32x^{-3}y^7}\right)^{-\frac{1}{3}}$$

2. Solve the following equation.

$$3\sqrt{10 - 3x} - 4 = 11$$

Problem 6 (10 points)

Write the equation of the circle given below in standard form. Identify the center and radius of the circle and graph it. Label 4 points on the graphs with coordinates.

$$x^2 + y^2 + 18x - 14y + 94 = 0$$

Problem 7 (10 points)

Solve the following system of equations. Write answers in the form (x, y)

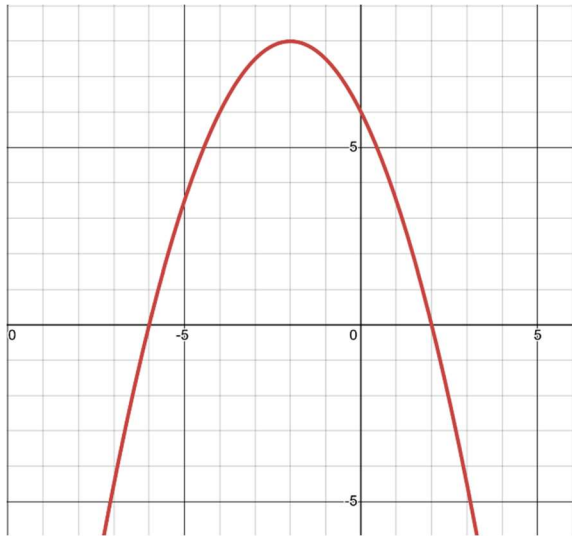
$$\begin{aligned} 2x - y^2 &= -6 \\ x^2 + 6y^2 &= 25 \end{aligned}$$

Problem 8 (20 points)

1. Write a cubic expression (degree 3) with one variable whose leading coefficient is -10 and whose roots are $0, -5, 16$.
2. Given the points $(-4, 5)$ and $(8, -9)$
 - a. Write an equation of the line passing between the two points.
 - b. Calculate the distance between the two points.
 - c. Find the midpoint between the two points.

Problem 9 (10 points)

For parts 1 – 5, refer to the following graph of $y = ax^2 + bx + c$



1. Find all solutions to $ax^2 + bx + c = 0$
2. What is the value of the constant coefficient c ? Justify your answer.
3. Is the coefficient a positive, negative, or 0? Justify your answer.
4. Without solving the system, determine the number of distinct real solutions of the system of equations $y = ax^2 + bx + c$ and $y = 4$.
5. What point is the vertex of the graph?

Problem 10 (10 points)

1. Solve the equation $4^x = 125$ to three decimal places.
2. Without using a calculator, calculate $\log_3 \left(\frac{27}{\sqrt[5]{9}} \right)$

3. **Problem 11** (10 points)

Given the formula for compound interest is $A = P \left(1 + \frac{r}{n}\right)^{nt}$

1. Suppose you deposit \$50,000 into a savings account with an interest rate of 7.2% compounded monthly. Assuming no further deposits or withdrawals were made, how much money will be in the account after 10 years?
2. What is the total interest gained?