Math 097
Review for the Final Exam

1. A) Write \( \sqrt[9]{x^{4}} \) using a rational exponent. B) Write \( 7y^{3/5} \) using radical notation.

2. If the equation \( ax^{2} + bx + c = 0 \) has two distinct real solutions, which of the following could be a graph of \( f(x) = ax^{2} + bx + c \)? Explain your reasoning.
   a) ![Graph A]
   b) ![Graph B]
   c) ![Graph C]
   d) ![Graph D]

3. Let \( f(x) = x^{2} + x - 13 \). Find each of the following
   A) \( f(-2) \)
   B) \( f(6) \)

4. a) Simplify \( \sqrt[9]{18x^{9}y^{6}} \)
   b) Simplify \( \sqrt{x} \cdot \sqrt[5]{x} \)

5. Sketch the graph of \( y = x^{2} - 4x - 12 \) by finding all the intercepts, and the vertex.

6. Solve the equation: \( 2x^{2} - 3x - 2 = 0 \).

7. Solve the equation: \( \frac{2x+1}{x-1} = \frac{3}{5} \)

8. Solve the equation: \( \sqrt{x+5} - 3 = 7 \)
9. Compute: \((2 - i)(7 - 3i)\)

10. Simplify: \(5\sqrt{3} - \sqrt{12}\)

11. Simplify: \(\frac{2x^{-3}y^5}{x^4y^2}\) Your answer should not contain negative exponents.

12. Simplify \(6b^{-2}\) as much as possible. Answers should not contain negative exponents.

13. Add the rational expressions: \(\frac{x}{x^2 - 8x + 15} + \frac{4}{x - 3}\)

14. Recall the height of an object at time \(t\) is \(h(t) = -\frac{1}{2}gt^2 + v_0t + h_0\), where \(g\) is the acceleration due to gravity (32.2 ft/sec\(^2\) or 9.81 m/sec\(^2\)), \(v_0\) is initial velocity, and \(h_0\) is initial height above the ground. Rose throws a ball off a cliff that is 30 feet high with an initial velocity of 40 feet per second. When will the ball reach the ground?

15. Find the equation of the line passing through (-1, 0) and (3, 8)

16. Write the expression \(\frac{7x^2}{x - 8} - \frac{x^2 - 6x - 16}{49x}\) as a single fraction in lowest terms.

17. Write the expression \(\frac{y^5}{y^2 - 7y + 12} + \frac{9y}{y - 4}\) as a single fraction in lowest terms.

18. Suppose that the number of people who read a government report varies inversely with its thickness. As a typical example, a 200 page report was read by 14 people. Write an equation that gives the number of readers as a function of the thickness of the report.

19. Solve the system of equations:
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\begin{align*}
3x - 2y &= 17 \\
7x + 2y &= 33
\end{align*}
\]

20. Solve the system of equations:
\[
\begin{align*}
y &= 5x + 2 \\
7x - 2y &= -13
\end{align*}
\]