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 $\boldsymbol{a+bi}$ form. That means **NO DECIMAL SOLUTIONS.** Your test will be on Monday, April 8, 2024

1. Simplify the following expressions.
   A. [5] $(3+6)^{\frac{1}{2}}+(12-4)^{\frac{2}{3}}-(23)^0+\left(\frac{1}{5}\right)^{-2}$
   B. [5] $\frac{45ab^5-72a^7b^{13}+18ab^2}{-9ab^2}$
   C. [10] $\frac{5x^5-45x^4-110x^3}{10x^2-40}$

2. [10] Solve for x. $2x-3(4x-7)=-5x-13$

3. A. [5] Solve the following quadratic equation via quadratic formula.
   1. $4x^2-x+3=0$
   2. $-4x^2+12x+11=0$

   B. [10] Solve the following quadratic equation by completing the square and using the square root property.
   1. $3x^2-12x+13=0$
   2. $x^2+3x-11=0$

4. A. [5] Simplify the complex fraction.
   A. $\frac{\frac{2}{x}-\frac{3}{x^2}}{\frac{5}{x^2}+\frac{4}{x}}$ B. $\frac{12-\frac{7}{2y}}{\frac{7}{8y}-3}$ C. $\frac{\frac{3}{x}+\frac{4}{x+2}}{\frac{9}{x+2}-\frac{2}{x}}$

   B. [5] Divide the complex numbers. Write in $a+bi$ form. $\frac{5+4i}{3-2i}$

5. [10] Solve for x. Show all extraneous solutions.

$$\frac{24}{x^2+2x-15}=\frac{x}{x-3}-\frac{7}{x+5}$$

6. [10] Solve the following equation.
   A. $\sqrt{2x-6}+3=x$
   B. $\sqrt{a^2+16a+64}=a+2$
   C. $\sqrt{2p^2-15p+23}=p-3$
   D. $3\sqrt{2x+10}-x=9$
   E. $2\sqrt{4x+3}-3=2x$

7. [10] Assuming all variables are positive (Don't worry about what that means.), simplify the following expression.

$$\frac{3}{2}ab\sqrt{24a^3}+\frac{2}{3}\sqrt{54a^5b^2}-a^2b\sqrt{96a}$$

8. [10] Find the remaining roots of the following polynomial.
   A. $2x^3-3x^2-23x+12$ has a root at $x=-3$
   B. $5x^3-30x^2-90x-20$ has a root at $x=-2$
   C. $x^3-x^2-13x-35$ has a root at $x=5$

9. [10] Write a 3rd degree polynomial in standard form whose leading coefficient is 2 with roots are $0, -8$, and 6.

10. [10] If a triangle has an area of 110 ft^2 has a base that is two feet less than twice the height, what is the length of its base and height? (Area of a Triangle $\frac{1}{2}\cdot b\cdot h$)

11. [10] Assuming the variables take on positive values, simplify and write your answer as a simple fraction using only positive exponents with each variable appearing at most once:

$$\left(\frac{4x^3y^{-2}}{16x^{-3}y^4}\right)^{-\frac{1}{2}}$$

Answer Key

1. A. 31 B. $-5b^3 + 8a^6b^{11} - 2$ C. $\frac{x^3(x-11)}{2(x-2)}$
2. $x = \frac{34}{5}$
3. A. 1. $x = \frac{1}{8} \pm \frac{\sqrt{47}}{8}i$ 2. $x = \frac{-3 \pm 2\sqrt{5}}{2}$
   B. 1. $x = -2 \pm \frac{\sqrt{3}}{3}i$ 2. $x = -\frac{3}{2} \pm \frac{\sqrt{53}}{2}$
4. A. 1. $\frac{2x-3}{4x+5}$ 2. -4 3. $\frac{7x+6}{7x-4}$
   B. $\frac{7}{13} + \frac{22}{13}i$
5. $x = -1, x \neq 3$
6. A. $x \in \{3,5\}$ B. $a \neq -5$, no solution C. $p = 7, p \neq 2$
   D. $x \in \{-3,3\}$ E. $x \in \{-\frac{1}{2}, \frac{3}{2}\}$
7. $a^2b\sqrt{6a}$
8. A. $4, \frac{1}{2}$ B. $4 - 3\sqrt{2}, 4 + 3\sqrt{2}$ C. $-2 - \sqrt{3}i, -2 + \sqrt{3}i$
9. $2(x-0)(x+8)(x-6) = 2x^3 + 4x^2 - 96x$
10. Base: $20\ ft.$ Height: $11\ ft.$
11. $\frac{2y^3}{x^3}$