Disclaimer

You should use this practice exam to assess your speed and to improve your ability to correctly identify different problem types. The questions on this practice exam are taken from exams given in previous semesters, but they may not be representative of the questions that will appear on this semester's exam. You should also invest time re-reading the relevant parts of your textbook, reviewing your notes, and practicing homework problems.
1. Add, subtract, or multiply as directed. 
   Express your answer as a single polynomial in standard form. (16 points)

   a. \((3x - 4)^2\)

   b. \((7t - 3)(4t + 8)\)

   c. \((5x + 2y)(5x - 2y)\)

   d. \(7(2x^3 - 5x^2 - 3) - 4(4x^3 + 9x - 8)\)

2. Use synthetic division to find the quotient and remainder when \(2x^4 - 3x^2 + 2\) is divided by \(x - 2\). (5 points)
3. Simplify each expression. Assume that all variables are positive when they appear. (15 points)

a. $\sqrt[3]{16x^4} - x \cdot \sqrt[3]{2x}$

b. $\frac{(xy)^{1/4}(x^2y^2)^{1/2}}{(x^3y)^{3/4}}$

c. $\frac{2 - \sqrt{5}}{2 + 3\sqrt{5}}$
4. Fully factor each polynomial. If the polynomial cannot be factored, say it is *prime*. (20 points)
   
a. \(3 - 27x^2\)

b. \(9x^2 - 12x + 4\)

c. \(10x^2 - 7x - 6\)

d. \(x^3 - 3x^2 - x + 3\)

e. \(64 - 27x^3\)

5. Use synthetic division to determine whether \(x + 4\) is a factor of \(x^6 - 16x^4 + x^2 - 16\). (5 points)
6. Perform the indicated operation and simplify the result. (20 points)
   *Leave your answer in factored form.*

   a. \[
   \frac{12}{x^3 + x} \cdot \frac{x^3 + 1}{4x^2 - 4x + 4}
   \]

   b. \[
   \frac{1 - \frac{x}{x + 1}}{2 - \frac{x - 1}{x}}
   \]
6. Continued from the previous page.

c. \[ \frac{2x - 3}{x^2 + 8x + 7} - \frac{x - 2}{(x + 1)^2} \]

7. Find the quotient and remainder when \( 2x^4 - 3x^3 + x + 1 \) is divided by \( 2x^2 + x + 1 \). (5 points)
8. Simplify each expression. (10 points)

   a. \( \left( \frac{3x^{-2}}{4y^{-2}} \right)^{-3} \)

   b. \( \frac{9x^{-2}(yz)^{-1}}{3^3 x^4 y} \)

9. Find the value of \( |4x - 5y| \) when \( x = 3 \) and \( y = -2 \). (4 points)