COLLEGE ALGEBRA, EXAM 1
September 10, 2002

Show all work for full credit. You may use a calculator, but do not use books or notes. The point value of each problem is given in the left-hand margin. Read the directions carefully. You have 60 minutes.

(5) 1. Circle all of the numbers that are rational.
   7.56, -3/4, 17, \( \pi \), \( 2.313131... \)

(5) 2. On the number line below sketch the set of numbers satisfying the inequality
   \( 1.705 < x \leq 1.76 \). Indicate clearly the status of the endpoints.

(5) 3. Use absolute value notation to express: The distance between \( x \) and 3 is at most 5.

(5) 4. Perform the indicated operations by hand and write your answer as a fraction in reduced form. Work must be shown.
   \( \left( \frac{5}{4} - \frac{4}{3} \right) \div \frac{1}{4} = \)

(5) 5. a) Estimate the following expression by hand, by rounding the decimals to whole numbers. (Work must be shown.) Express your answer in scientific notation.
   \( \frac{(2.04 \times 10^4)^3}{1.98 \times 10^{-5}} \approx \)

   b) Now use your calculator to evaluate the expression in (a). Round your answer to two decimal places.

(5) 6. Simplify. No negative exponents should appear in your final answer.
   \( (-2x^2)^4(x^2)^{-5} = \)
(5) 7. Simplify. No negative exponents should appear in your final answer.
\[ \left( \frac{x^{-2}y^{3}}{yx^3} \right)^{-1} \]

(5) 8. Rationalize the denominator, and simplify.
\[ \frac{2}{1 + \sqrt{5}} = \]

(5) 9. Evaluate by hand. (You may check your work on your calculator, but only 1 point will be given on each part for the correct answer with no work shown.)

a) \[ \left( \frac{1}{8} \right)^{-2/3} = \]

b) \[ \sqrt[3]{9^3} = \]

(5) 10. Simplify the expression
\[ 7\sqrt{32} - 4\sqrt{50} \]

(5) 11. Perform the indicated operations and write the resulting polynomial in standard form.
\[ 3 - 2(x^5 - 5x^2 + 3) + x(x^4 - x) = \]
12. Expand and express your answer as a polynomial in standard form.

\[(2x + 1)^3 = \]

13. Find the area of the shaded region. Express your answer as a polynomial in standard form.

14. Factor.

\[2x^2 - 3x - 5 = \]

15. Factor.

\[4x^3 - x^2 + 12x - 3 = \]


\[x^3(3x + 1) + x^2(3x + 1)^2 = \]
17. Fill in the blanks to make the two sides equal.
   a) \( x^{1/3} + 3x^{4/3} = x^{1/3}(1 + \underline{____}) \).

   b) \( \frac{x-2\sqrt{x}}{\sqrt{x}} = \sqrt{x} - \underline{____} \)

18. Perform the indicated operations and simplify.
   \((3x^2 + x - 1)(3x^2 + 1) = \)

19. Perform the indicated operations and simplify.
   \( \frac{x}{x^2 - 4} = \)

20. Perform the indicated operations and simplify.
   \( \frac{1}{x} - \frac{x-2}{x^2 + x} = \)