EXAM 3 - MATH 102
DATE: Friday, November 9
INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Factor completely the following polynomials:

   (a) $x^7 - 81x^3y^4$ (2 points)

   (b) $-8x^4y - 16x^3y - 6x^2y - 12xy$ (2 points)

   (c) $x^2 + 12x + 36 - 9y^2$ (1 point)

2. Factor completely:

   (a) $-12x^3 - 36x^2y - 27xy^2$ (2 points)

   (b) $27x^7 + 64x^4y^3$ (3 points)

3. Solve the following equations:

   (a) $(2x - 1)(x - 3) = 3x - 5$ (2 points)

   (b) $x^3 - 5x^2 - 9x + 45 = 0$ (3 points)

4. (a) The hypothenuse of a right triangle is 8 inches longer than the shortest side and 1 inch longer than the remaining side. Find the dimensions of the triangle. (3 points)

   (b) Find the values that make the rational expression $\frac{x+7}{x^2-x-2}$ undefined. (1 point)

   (c) Write the rational expression $\frac{5z}{z-1}$ with denominator $z^2 + 2z - 3$. (1 point)

5. (a) Perform the operation and simplify: $\frac{x^2+xy-2y^2}{x^2-4y^2} \div \frac{x^2-y^2}{x^2-2xy} \cdot \frac{(x+y)^2}{x^2}$. (1 point)

   (b) Perform the operation and simplify: $\frac{x+1}{x^2-x-2} - \frac{x}{x^2-5x+4}$. (2 points)

   (c) Perform the indicated operations and give the answer in simplified form: $\frac{\frac{3}{x-4} - \frac{16}{x-3}}{\frac{2}{x-3} - \frac{15}{x+5}}$. (2 points)