Math 108 Exam #1
February 11, 2015

Time: 1 hour and 25 minutes
Instructions: Show all work for full credit. No outside materials or calculators allowed.
Extra Space: Use the backs of each sheet for extra space. Clearly label when doing so.

Name: ________________________________
ID #: ________________________________
Instructor/Section: ____________________

“I pledge by my honor that I have abided by the NJIT Academic Integrity Code.”
_____________________________ (Signature)

1. Evaluate the following (16 points):
   a. \( \frac{1}{2}x - 8 = 1 \)
   b. \( 8y - 6(y - 3) = 3(y + 1) \)
   c. \( 5t - 13 = 12 - 5t \)
   d. \( 8 - 2x = 14 - 2x \)
2. Factor completely: (12 points)

   a) \(6x^2 + 7x - 5\)  
   b) \(x^2 - 2x - 3\)  
   c) \(8x^4 y^2 + 6x^3 y - 2xy^4\)  
   d) \(x^5 y^2 - xy^6\)

3. Rationalize the denominator: (8 points)

   a) \(\frac{\sqrt{6}}{\sqrt{3} + \sqrt{2}}\)  
   b) \(\frac{-3}{\sqrt{8}}\)

   a) ________________________  
   b) ________________________  
   3) ________________________
4. Simplify each expression write you final answer with no negative exponents. (10 Points)

a) \(\sqrt{200} - \sqrt{32}\)

b. \(\left(\frac{3x^2y^2}{x^2y^{\frac{1}{2}}}\right)^{-2}\)

5. Write the following numbers in scientific notation. If it is already in scientific notation then write in decimal notation: (4 points)

a) 78,250,000,000

b) 2.08 \times 10^{-8}

a)__________________

b)__________________
6. Perform the indicated operation and simplify: (6 points)

   a) $3(x + 6) + 4(2x - 5)^2$

   a) __________________________

   b) $(2x - 5)(x^2 - x + 1)$

   b) __________________________

   c) $(x^3 + 6x^2 - 4x + 7) - (3x^2 + 2x - 4)$

   c) __________________________
7. Perform the indicated operation. Simplify and leave your answer in factored form: (10 points)

a. \( \frac{x+1}{x-1} - \frac{x-1}{x+1} \)

b. \( \frac{2}{x^2 - 3x + 2} + \frac{6}{x^2 - 1} \)

8. Factor the following using a special formula: (10 points)

a) \( 8x^3 - 125y^3 \)

b) \( 27x^3 + y^3 \)

9. Find the product: \( (\sqrt{x} + \sqrt{y})(\sqrt{x} - \sqrt{y}) \) (4 points)
10. (10 points)

a) Factor by grouping: \(2x^3 + x^2 - 6x - 3\)

\[a) \text{_____________________________}\]

b) Perform the indicated operation \((1 + x)(2 - x) - (3 - x)(3 + x)\).

\[b) \text{_____________________________}\]

11. Evaluate: (4 points)

a) \((-32)^{\frac{2}{3}}\)

\[a) \text{_____________________________}\]

b) \(\left(\frac{27}{8}\right)^{\frac{2}{3}}\)

\[b) \text{_____________________________}\]
12. Basic Skills: **NOTE: No Partial Credit will be Given on these problems (6 points)**

   a) Simplify the expression: \( 6y^2 \left( 2y^4 \right)^2 \)

   b) Evaluate the expression for an exact solution: \( -25^{\frac{1}{2}} \)

   c) Simplify fully, using positive exponents: \( \frac{\left( 4x^6 y^4 \right)^{1/2}}{x^2 y^{-3}} \)