Math 108 Exam #1
September 28, 2016

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.

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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. \( \frac{x}{3} - \frac{3x}{4} = 2 \)
   
   b. \( 4b + 2 - 5b = 7 - 6b \)

   c. \( \frac{5}{4}x + \frac{1}{2} = x - \frac{1}{2} \)

   d. \( x - 3(2x + 3) = 8 - 5x \)
2. Factor completely. If the expression is not factorable state not factorable: (12 points)

a) \(3x^3 + 2x^2 - 12x - 8\)

b) \(x^2 + 5x - 50\)

c) \(8x^2 - 17x - 21\)

d) \(16x^4 - 64\)

3. Rationalize the denominator: (8 points)

a) \(\frac{\sqrt{t} + 5}{\sqrt{t} - 5}\)

b) \(\frac{-3}{\sqrt{5}}\)
4. Simplify each radical expression and, if possible, complete the operation indicated. (10 Points)

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

b) \( \sqrt[3]{16x} - \sqrt[3]{54x^4} \)

5. Evaluate: (4 points)

\[
\frac{6.0 \times 10^8}{3.0 \times 10^{-3}}
\]
6. Perform the indicated operation and simplify: \( 6 \text{ points} \)

a) \( \sqrt[6]{16x^2y^4z^4} \)

b) \( \sqrt[4]{512} \)

c) \( \sqrt[3]{320} \)
7. **(10 points)**

An investment firm has $100,000 to invest in a for a client and decides to invest it in two stocks, A and B. The expected annual rate of return, or simple interest, for stock A is 15%, but there is some risk involved, and the client does not wish to invest more than $50,000 in this stock. The annual rate of return on the more stable stock B is anticipated to be 10%. Determine whether there is a way of investing the money in one year so the annual interest is

a) $12,000  

b) $13,000  

(Hint: \( I = Prt \))

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

a) \( 8x^3 + 27 \)

\[ \text{a)} \quad \text{__________________________} \]

b) \( 9x^2 - 16y^2 \)

\[ \text{b)} \quad \text{_____________________________} \]
9. Find the product: \((4x+1)(16x^2 - 4x + 1)\) (4 points)

10. Simplify: (10 points)

a) \(-3\sqrt{18} + 3\sqrt{8} - \sqrt{24}\)

b) \(-\sqrt{45} + 2\sqrt{5} - \sqrt{20} - 2\sqrt{6}\)
11. Evaluate: (4 points)

a) \(-13^2\)

b) \(\left(\frac{7}{8}\right)^{-2}\)

12. (6 points)

a) Simplify the expression: \(6y^2 \left(2y^4\right)^0\)

b) Evaluate the expression for an exact solution: \(-25^{\frac{1}{3}}\)

c) Simplify fully, using positive exponents: \(\left(\frac{\frac{2}{a^3b^2}}{a^2b}\right)^6\)