Math 365 Exam 3
November 16, 2012
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Name_____

There are 8 questions, for a total of 100 points. Point values are written beside each question. *No calculators allowed. Show your work for full credit.*

1. [15] Find the sum of the first 100 terms of the arithmetic sequence whose nth term is $5 - 3n$.

2. (a) [5] Daniel attempts to do a division problem as follows:

$$\frac{3}{4} \div \frac{1}{8}$$

Correct Daniel's mistake and explain what you would tell him.

(b) [5] Chelsea argues that the following number is not rational since it is not the quotient of two integers:

$$\frac{\frac{2}{3}}{\frac{3}{4}}$$

Is Chelsea correct? Explain in detail why or why not.

3. [15] Convert the following repeating decimal to a fraction (you need not simplify):

$$10.2\overline{41}$$

4. [20] Write each of the following in simplest form:

(a) $\left(\frac{1}{2}\right)^3 \cdot \left(\frac{2}{3}\right)^2$

(b) $2\frac{2}{5} \div \frac{3}{5}$

(c) $3^{-5} \div 3^{-6}$

(d) $1.2\overline{1} + 2.1\overline{2}$

5. [5] (a) Which of the following represent terminating (i.e. finite) decimals? Circle all those that do.

$$\frac{21}{20} \qquad \frac{25}{9} \qquad \frac{9}{24} \qquad \frac{3 \cdot 5}{2^4 \cdot 5^2} \qquad \frac{3^2 \cdot 17}{2^3 \cdot 3^5}$$

(b) [5] Order the following decimals from least to greatest:

$$0.123 \qquad 0.12\overline{3} \qquad 0.1\overline{23} \qquad 0.\overline{123}$$

6. [10] Find the sum $1 + \frac{1}{5} + \frac{1}{25} + \frac{1}{125} + \cdots$

7. [5] If the fraction $\frac{1}{23}$ is expressed as a repeating decimal, what is the maximum possible period? (You need not find the decimal.) Explain how you determined your answer.

8. [15] (**True/False.**) For each of the following statements, write "T" if it is true and "F" if it is false. (You need not give counterexamples for false statements.)

(a) _____ For all integers x and y, $|x + y| = |x| + |y|$.

(b) _____ The set of nonzero integers is closed under multiplication.

(c) _____ The set of nonzero integers is closed under division.

(d) _____ The set of nonzero rational numbers is closed under division.

(e) _____ Division of rational numbers is commutative.

(f) _____ $0.\overline{9} < 1$