Math 187 Assignment VIII

Dr. Holmes

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This problem set is due on Tuesday, July 13.

1. Is $\frac{1}{6250}$ expressible as a terminating decimal? You should be able to answer this question without consulting your calculator (indeed, your calculator may not be much help, depending on how many decimals it displays). If it is expressible as a terminating decimal, write down the exact decimal.

2. Determine the exact form of the fraction $\frac{3}{17}$ as a repeating decimal.

   Write a pair of fractions bounding $\frac{3}{17}$ above and below as closely as possible, both with denominator 100; then a pair of fractions bounding $\frac{3}{17}$ above and below as closely as possible, both with denominator 10000; then a pair of fractions bounding $\frac{3}{17}$ above and below as closely as possible, both with denominator 1000000.

3. Compute $\frac{3}{5}$ as an infinite repeating "decimal" in base 7.

   Using this infinite "decimal" in base 7, write pairs of fractional approximations bounding $\frac{2}{9}$ above and below more and more closely with denominators 7 in the first pair, 49 in the second, 343 in the third.

4. Write the number represented by $25.3212121\ldots$ as a fraction (the block 21 repeats forever).

5. Write the number represented by $1.122122122\ldots$ in base 3 as a fraction. The block 122 repeats forever. Hint: the approach to be taken is exactly the same as in the previous problem, except for the difference of base.

6. Use the Euclidean algorithm to determine the "simplest form" of the fraction $\frac{5841}{4578}$.

7. Verify that the definition of multiplication for our constructed rational numbers is independent of the choice of ordered pair (or "fraction") chosen to represent the rational number.