MATHEMATICS FOR ELEMENTARY EDUCATION I (MATH 151)
SPRING 2015
EXAM II PROBLEM SET

Part I

(1) Explain how to adapt the standard algorithm for addition to add two fractions. Be sure and justify your modification to the standard algorithm.

(2) Explain how to adapt the standard algorithm for addition to add two decimals. Be sure and justify your modification to the standard algorithm.

(3) Explain how to adapt the standard algorithm for subtraction to subtract two fractions. Be sure and justify your modification to the standard algorithm.

(4) Explain how to adapt the standard algorithm for subtraction to subtract two decimals. Be sure and justify your modification to the standard algorithm.

(5) Explain how to adapt the standard algorithm for multiplication to multiply two fractions. Be sure and justify your modification to the standard algorithm.

(6) Explain how to adapt the standard algorithm for multiplication to multiply two decimals. Be sure and justify your modification to the standard algorithm.

(7) Explain how to adapt the standard algorithm for division to divide two fractions. Be sure and justify your modification to the standard algorithm.

(8) Explain how to adapt the standard algorithm for division to divide two decimals. Be sure and justify your modification to the standard algorithm.

(9) Covert $3.456\overline{234}$ to a simplified fraction.

(10) Find a simplified fraction with no 0's or 9's in the denominator such that the decimal expansion has 2 non-repeating digits and 3 repeating digits.

(11) We note that it is the case that every composite number n has a prime factor that is at most $\sqrt{n}$. Show that the following tow statements are true or give a counterexample:
  - ◆ Every composite number has no prime factor strictly greater than $\sqrt{n}$.
  - ◆ Every composite number has a prime factor greater than $\sqrt{n}$.

(12) Adam claims that $\frac{4}{9} < \frac{5}{7}$ because $4 < 5$ and $9 > 7$. Is Adam right? If not explain why not, if so explain whether this is part of a general pattern.

(13) Show that $\frac{4}{3} < \sqrt{2} < \frac{3}{2}$. How can we use properties of the rational numbers to find a fraction closer to $\sqrt{2}$.

(14) Sarah is multiplying two decimal numbers on her calculator and gets 50.5296. She notices that when she wrote down the problem she forgot the decimal place and has the numbers 1936 and 261. What could the original numbers have been? (List all possibilities).

(15) When dividing two decimal numbers the result is 8.4 If the original problem without decimal places was $4851 \div 5775$, where can the decimals be placed?

(16) Give an example to show that the positive irrational numbers are not closed under addition. Be sure to explain why the summands are positive and irrational. You may assume that the square root of any prime number is irrational.

(17) Can the product of two repeating decimals be repeating? terminating? neither? Either give an example or explain why not for all three cases.