MAT115 Exam 1 (Fall 2011)

Name:

Directions: Show your work! Answers without justification will likely result in few points. Your written work also allows me the option of giving you partial credit in the event of an incorrect final answer (but good reasoning). Indicate clearly your answer to each problem (e.g., put a box around it). FYI: 2 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 **Good luck!**

Problem 1: (15 pts) Write the following three prime factorizations: if a number is prime, then show what numbers you attempted as factors; if a number is composite, find the product of primes in its prime factorization.

a. 887

b. 888

c. 889

Problem 2: (20 pts) Counting by partition:

a. You have 53 sheep. Illustrate how to count them by partition: what string of sheep will you report to the king?

b. As priest for the king, your job is to translate the strings the peasants send into numbers of sheep, so that they can be taxed. A peasant reports the string "1, 1, 0, 1, 0, 0, 1." How many sheep do they have? Show your work!

Problem 3: (10 pts) Monty Hall strikes again! Now he's got five doors. He gives you a choice of two doors for your own. He then shows you that behind two of the remaining three doors there are donkeys. He asks you if you if you'd like to trade your TWO doors for the one door he's got remaining.

What do you do? Why? What are the associated probabilities associated with sticking and with switching?

Problem 4: (10 pts) Short answer (do five – mark "skip" on one of them):
a. Is the number 1 prime? Explain! [A "yes" or "no" answer alone will earn zero points.]
b. Give two other methods of counting discussed in class (besides counting by partition).
c. Give some of the history of zero. Did the ancient Greeks have it? How about the ancient Egyptians Who put zero on solid ground, and when?
d. Why didn't the ancient Egyptians like fractions such as 13/18? How can we explain their interest i unit fractions?
e. Describe and give the history and value of the Rosetta stone.
f. For the birthday problem, about how big a crowd in a room gives you the edge when you bet that there will be two people in the room with a common birthday? [You need to get this to within two people!]

Problem 5: (10 pts) This problem concerns the "Great Fraudini" and his card trick:
a. The number in the mind of the lovely assistant appears on only four cards, identified by the number in their lefthand corner (32, 8, 2, and 1). What is the number?
b. Which of Fraudini's cards will the number 47 appear on?
Problem 6: (10 pts) You roll two ordinary fair dice: one red, one blue.
a. Draw the sample space of different rolls possible. How many events does it contain?
b. i. What is the probability that the sum is 5, 6, or 7?
ii. What is the probability that the red die is less than 3, while the blue die is even?

Problem 7: (20 pts) Egyptian Math

a. Use Egyptian Multiplication to multiply 47*139.

b. Divide 31 loaves among 18 people, writing the answer so as to make the ancient Egyptians happy (using only unit fractions). You may use either of our two methods (the unit table – Hint: $\frac{2}{9} = \frac{1}{6} + \frac{1}{18}$ – or the multiplication table backwards).

