Old Sample Final
Math 125 Kouitz Fall 2010

On the final to get full credit you **must show your work**. No work, no credit.
The final will have ten questions, each worth 10 points.

1. The sketch below shows one block of the family-income histogram for a certain city. About what percent of the families in the city had incomes between $18,000 and $25,000?

   ![Histogram Sketch]

   - % per $1,000
   - Income (thousands of dollars)

2. A survey of a large group of men found that their average height was 67 inches with an SD of 4 inches.
   (a) A 72.4-inch man has what percentile rank in height? (Assume normal curve.)
   (b) How tall is a man whose percentile rank in height is 40%? (Assume normal.)
   (c) Assuming the normal curve, about what percentage of these men are between 62 and 66 inches tall?

3. Two draws will be made at random from a deck of cards. The unconditional probability of getting the king of hearts on the first draw is 1/52. The unconditional probability of getting the king of hearts on the second draw is 1/52.
   (a) The chance that the first draw turns out to be the king of hearts and the second draw turns out to be the king of hearts is \(1/52 \times 1/52 = 1/2704\) when the draws are made _______ replacement, because then the events are _______.
   (b) The chance that at least one of the two draws turns out to be the king of hearts must be calculated as \(1 - (51/52 \times 51/52) = 103/2704\) when the draws are made _______ replacement, because then the events are not _______.
   (c) The chance that neither of the two draws turns out to be the king of hearts is \(51/52 \times 50/51 = 50/52 = 25/26\) when the draws are made _______ replacement, because then the draws are not _______.

   Fill in the blanks using one option from each pair below for each sentence.
   (with, without) (independent, mutually exclusive)
4. A box contains one red marble and nine green ones. Five draws are made at random with replacement.
   True or false: the chance that exactly two draws will be red is
   \[ 10 \times \left( \frac{1}{10} \right)^2 \left( \frac{9}{10} \right)^3. \]

5. A die is rolled one thousand times. The percentage of aces (\(\square\) should be around ________, give or take ________ or so.
   (a) The first step in solving this problem is
      i. computing the SD of the box.
      ii. computing the average of the box.
      iii. setting up the box model.
      Choose one option and explain.
   (b) Now solve the problem.
   (c) Find the chance that the percentage of aces in the one thousand rolls is 19 or more.
   (d) For more rolls, would the give or take go up or down?
   (e) Find the number of rolls necessary for the give or take to be 0.25%.

6. An ESP experiment asks the subject to guess unseen which target was chosen randomly from 10 targets by the researcher. Suppose that in 1,000 trials, a subject scores 173 correct guesses.
   (a) Set up the null hypothesis as a box model.
   (b) The SD of the box is _______. Fill in the blank, using one of the options below, and explain briefly.
      \[ \sqrt{0.1 \times 0.9} \quad \sqrt{0.173 \times 0.827} \]
   (c) Make the z-test.
   (d) What do you conclude?

7. One day, upon tossing a single die 600 times, I got:

   108 ones, 93 twos, 114 threes, 120 fours, 93 fives, and 72 sixes.

Compute \(\chi^2\) and find \(P\) for this experiment. Is the die biased, based on those 600 tosses?
Justify your conclusion by comparing the \(P\)-value you obtained to the benchmark (5% or 1%) that you are using.