Name: ________________________________ **MAT 221**

Fall 2014 **Problem Set 8**

Formulae:

(i) The sampling distribution for a large SRS of size n ($n \geq 30$) from a population with mean μ and standard deviation σ is $N(\mu, \sigma/\sqrt{n})$. This formula always applies regardless of the sample size if the distribution is normal.

(ii) If you take an simple random sample from a large population with a proportion of p success then the number of counts $X \approx N\left(np, \sqrt{np(1-p)}\right)$ and the sample proportion of successes is $\hat{p} \approx N\left(p, \sqrt{\frac{p(1-p)}{n}}\right)$.

Problem 1: For women aged 18–24, systolic blood pressures are normally distributed with a mean of 114.8 and a standard deviation of 13.1. Hypertension is commonly defined as a systolic blood pressure above 140.

(a) Find the proportion of women who have systolic blood pressure greater than 140.

(b) If 5 women in that age group are randomly selected, find the probability that their mean systolic blood pressure is above 140.

(c) If for men aged 18–24, the measurement of systolic blood pressure has a mean of 125.2 and a standard deviation of 14.2. How does this situation differ from the situation in the parts above? [Hint: What is the distribution in this case…read carefully!]

(d) If a group of 5 men are randomly selected, can you find the probability that their mean systolic blood pressure is below 120? What about if you selected a group of 20 men? What about a group of 50 or 100 men?

Problem 2: Consider the fact that 8% of men are colorblind.

(a) Consider a SRS of 7 men. What is the probability that at least 3 of these men are colorblind?

(b) Consider a SRS of 500 men. What is the approximate probability that at least 50 men in this sample are color blind?

(c) Consider a SRS of 500 men. What is the approximate probability that less than 5% of these men are colorblind?