STA 110B Name_____

Spring 2000 Section_____

Quiz 4

week of 14FEB2000

1. (3 points) Of the volunteers donating blood in a clinic, 80% have the Rhesus factor present in their blood. If five volunteers are randomly selected, what is the probability that exactly three of the five have the Rhesus factor?

$$\begin{aligned} p(s) &= \binom{n}{s}\pi^s(1-\pi)^{n-s} \\ p(3) &= \binom{5}{3}(0.8)^3(0.2)^{5-3} \\ &= \frac{5!}{3!2!}(0.8)^3(0.2)^2 \\ &= 0.2048 \end{aligned}$$

2. The grade point averages of a large population of college students are normally distributed with a mean of 2.4 and a standard deviation of 0.8.

a. (3 points) What fraction of students will possess a grade point average in excess of 3.0?

$$\begin{aligned} P(X > 3.0) &= P(Z > \frac{3.0-2.4}{0.8}) \\ &= P(Z > 0.75) \\ &= 0.227 \end{aligned}$$

b. (4 points) What grade point average would one need to have in order to be at the 95th percentile?

$$P(X > x) = 0.05$$

So, z denotes the score which separate the lower 95% from the top 5% of scores. Since we don't have a normal table with $\mu = 2.4$ and $\sigma = 0.8$, we will first have to find the number which marks the 95th percentile for the standard normal distribution. Then transform it to the scale that the grades are on, using

$$\begin{aligned} z &= \frac{x-\mu}{\sigma} \\ z &= \frac{x-2.4}{0.8} \\ x &= 2.4 + 0.8z \end{aligned}$$

In the standard normal table in your book, there isn't an exact match for 0.05; this value is flanked by $z = 1.64$ and $z = 1.65$. You can use either. Some people interpolate between the two, using 1.645.

$$\begin{aligned} P(Z > 1.64) &= 0.051 \\ P(Z > 1.65) &= 0.049 \end{aligned}$$

Your choice from these values for z will determine your answer as follows.

$$\begin{aligned} z = 1.64 &\rightarrow x = 3.712 \\ z = 1.65 &\rightarrow x = 3.72 \\ z = 1.645 &\rightarrow x = 3.716 \end{aligned}$$