Stat 230

June 16 Demo/ Practice problems

All the problems are ungraded. Problems courtesy to Greg Malen.

Pr. 1 Let X be a random variable with expectation 0 and variance 1. What integer value k will assure us that $\Pr(|X| \geq k) \leq .01$?

Pr. 2 Let S_n be the number of successes in n Bernoulli trials with probability p for success on each trial. Show, using Chebyshevs Inequality, that for any $\epsilon > 0$

$$\Pr(|\frac{S_n}{n} - p| \geq \epsilon) \leq \frac{p(1-p)}{n\epsilon^2}$$

Pr. 3 A fair coin is tossed a large number of times (n). Does the Law of Large Numbers assure us that, if n is large enough, with probability > 0.99 the number of heads that turn up will not deviate from $n/2$ by more than 100?

Pr. 4 We have two coins: one is a fair coin and the other is a coin that produces heads with probability $3/4$. One of the two coins is picked at random, and this coin is tossed n times. Let S_n be the number of heads that turns up in these n tosses. Does the Law of Large Numbers allow us to predict the proportion of heads that will turn up in the long run? After we have observed a large number of tosses, can we tell which coin was chosen?