Stat 230

Due April 18 before class

Pr. 1 A club serves dinner to members only. They are seated at 12-seat tables. The manager observes over a long period of time that 95 percent of the time there are between six and nine full tables of members, and the remainder of the time the numbers are equally likely to fall above or below this range. Assume that each member decides to come with a given probability p, and that the decisions are independent. How many members are there? What is p?

Pr. 2 Let S_n be the number of successes in n Bernoulli trials with probability .8 for success on each trial. Let $A_n = \frac{S_n}{n}$ be the average number of successes. In each case give the value for the limit, and give a reason for your answer.

(a) $\lim_{n\to\infty} \mathrm{P}(A_n = .8)$

(b) $\lim_{n\to\infty} \mathrm{P}(.7n < S_n < .8n)$

(c) $\lim_{n\to\infty} \mathrm{P}(S_n < .8n + .8\sqrt{n})$

Pr. 3 Let X_k, $1 \le k \le n$, be a sequence of random variables, all with mean μ and variance σ^2, and Y_k is the standardized version of X_k. Let S_n and T_n be the sum of the X_k and Y_k, and S_n^* and $T_n^?$ be their standardized versions. Show $S_n^* = T_n^* = T_n/\sqrt{n}$.

Pr. 4 A surveyor is measuring the height of a cliff known to be about 1000 feet. He assumes his instrument is properly calibrated and that his measurement errors are independent, with mean 0 and variance 10. He plans to take n measurements and form the average. Estimate, using (a) Chebyshevs inequality and (b) the normal approximation, how large n should be if he wants to be 95 percent sure that his average falls within 1 foot of the true value. Now estimate, using (a) and (b), what value should σ^2 have if he wants to make only 10 measurements with the same confidence?