Math 313-01, Homework for Quiz # 16

1. A biased coin lands heads with probability 1/10. This coin is flipped 200 times. Give an upper bound on the probability that the coin lands heads at least 120 times using

(i) Markov's inequality

(ii) Chebyshev's inequality

(iii) Find the exact probability and compare it with the estimates in (i) and (ii)

2. A fair coin is flipped 1000 times.

(i) Use the **binomial distribution** to find the probability that the number of heads is between 350 and 450.

(ii) Use the **central limit theorem WITHOUT the continuity correction** to find the probability that the number of heads is between 350 and 450.

(iii) Use the **central limit theorem WITH the continuity correction** to find the probability that the number of heads is between 350 and 450.

(iv) Compare your answers in (i), (ii) and (iii)

3. In 2010, the mean score of the SAT was $\mu = 1509$, with a standard deviation $\sigma = 339$. Assume that 300 students take the SAT. Use the **central limit theorem** to find the probability that their average score is between 1450 and 1600. Assume that the SAT score is a **continuous** random variable