CSE 312: Foundations of Computing II
Quiz Section #8: Normal distribution and Chernoff bound

1. Before putting any bets down on roulette, you watch 100 rounds, each of which results in an integer between 1 and 36. You count how many rounds have a result that is odd and, if the count exceeds 55, you decide the roulette wheel is unfair. Assuming the roulette wheel is fair, approximate the probability that you make the wrong decision.

2. A factory produces X_i gadgets on day i, where the X_i are independent and identically distributed random variables, each with mean 5 and variance 9.

   (a) Approximate the probability that the total number of gadgets produced in 100 days is less than 440.

   (b) Approximate the greatest value of n such that $P(X_1 + X_2 + \cdots + X_n \geq 5n + 200) \leq 0.05$.

3. Work through the application of the Chernoff bound in slides 29-31 of `http://courses.cs.washington.edu/courses/cse312/13au/slides/09tails.pdf`