Stat 134: Section 4

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You may leave your answers in Φ or Φ^{-1} if necessary, where $\Phi(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-z^2/2} dz$ and Φ^{-1} is the inverse of Φ.

Problem 1

Let H be the number of heads in 400 toses of a fair coin. Find normal approximations to

a. $P(190 \leq H \leq 210)$

b. $P(210 \leq H \leq 220)$

c. $P(H = 200)$

d. $P(H = 210)$

Ex 2.2.1 in Pitman's Probability

Problem 2

Suppose you bet a dollar on red, 25 times in a row, at roulette. Each time you win a dollar with probability 18/38, lose with probability 20/38. Find, approximately, the chance that after 25 bets you have at least as much money as you started with.

How many wins do you need to at least break even?

Ex 2.2.5 in Pitman's Probability

Problem 3

A fair coin is tossed repeatedly. Consider the following two possible outcomes:

- 55 or more heads in the first 100 tosses
- 220 or more heads in the first 400 tosses

a. Without calculation, say which of these outcomes is more likely. Why?

b. Confirm your answer to a) by a calculation.

Ex 2.2.3 in Pitman's Probability

Problem 4

A fair coin is tossed 10,000 times. Find a number m such that the chance of the number of heads being between $5000 - m$ and $5000 + m$ is approximately $2/3$.
Ex 2.2.12 in Pitman's Probability