STAT 134: Section 4

Adam Lucas

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

Conceptual Review

1. Suppose X has a Binomial(n, p) distribution. What is the Normal approximation to the probability $P(a \leq X \leq b)$?

2. *"Why is Normal approximation useful?"* Consider what might be difficult about calculating $P(a \leq X \leq b)$ exactly, when n is large and p is small.

3. *"Why do we use the continuity correction?"* Consider, for example, what goes awry with the Normal approximation to $P(a \leq X \leq b)$ if $a = b$ and we do not use the continuity correction.

Problem 1

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

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

b. $P(H \leq 220)$

c. $P(H = 205)$

Ex 2.2.1 in Pitman's Probability

Problem 2

An airline knows that over the long run, 90% of passengers who reserve flights show up for their flight. On a particular flight with 300 seats, the airline accepts 324 reservations.

a. Assuming passengers show up independently of each other, what is the chance the flight will be overbooked?

b. Suppose people always travel in pairs. Will that increase or decrease the chance above?

Ex 2.2.9 in Pitman's Probability