

## *Stat 134: Section 4*

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

### *Conceptual Review*

- a. When do we use the Normal approximation to the Binomial distribution?
- b. What is the continuity correction when using this approximation? Why do we use it?

### *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*

*Problem 3*

Suppose that 48% of citizens in a large state support a particular candidate for governor. That candidate is in charge of setting up the election, and wants to maximize his chances of winning the election. Suppose that  $n$  citizens at random will be allowed to vote.

- a. Does the candidate want to choose a large  $n$  or a small  $n$ ?
- b. Find the smallest  $n$  for which there is a 95% chance that the candidate will lose the election.