DATA 605 - Discussion 9

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Section 9.1, Page 339, Exercise 12

Exercise 12

A balanced coin is flipped 400 times. Determine the number x such that the probability that the number of heads is between 200 - x and 200 + x is approximately .80.

Solution

$P(200 - x \leq S_n \leq 200 + x) \approx 0.80.$

$\mu = np = 400 \cdot 0.5 = 200.$

$\sigma = \sqrt{n \cdot p \cdot q} = \sqrt{400 \cdot 0.5 \cdot 0.5} = 10.$

$P(\frac{199.5-200-x}{10} \leq Z \leq \frac{200.5+200+x}{10}) \approx 0.80.$

$P(\frac{-x}{10} \leq Z \leq \frac{x}{10}) \approx 0.80.$

$2 \cdot P(0 \leq Z \leq \frac{x}{10}) \approx 0.80.$

$P(Z \leq \frac{x}{10}) - P(Z \leq 0) = \frac{0.80}{2}.$

$P(Z \leq \frac{x}{10}) - 0.5 = \frac{0.80}{2}.$

$P(Z \leq \frac{x}{10}) = 0.9.$

Looking at the Z-table, x is approximately 13.