# AI1110 - Probability and Random Variables
# Assignment 9

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# Outline

# Question

## EXAMPLE 8-29

A coin is tossed 64 times, and heads shows 22 times.
(a) Test the hypothesis that the coin is fair with significance level 0.05.
(b) We toss a coin 16 times, and heads shows k times. If k is such that $k_1 \leq k \leq k_2$ , we accept the hypothesis that the coin is fair with significance level $\alpha = 0.05$. Find $k_1$ and $k_2$.

# Solution

## Solution

(a) In this problem, n = 64 , k= 22 , $p_0 = q_0 = 0.5$

$$q = \frac{k - np_0}{\sqrt{np_0q_0}} = 2.5$$

$$z_{\alpha/2} = z_{1-\alpha/2} \simeq -2$$

Since 2.5 is outside the interval (2 , -2), we reject fair coin hypothesis

## Solution Continued

(b) We know that here,
n = 16, $p_0 = q_0 = 0.5$

$$\frac{k_1 - np_0}{\sqrt{np_0q_0}} = z_{\alpha/2}$$

$$\frac{k_2 - np_0}{\sqrt{np_0q_0}} = -z_{\alpha/2}$$

This yields $k_1 = 8 - (2 \times 2)$, $k_2 = 8 + (2 \times 2)$
$k_1 = 4$ and $k_2 = 12$