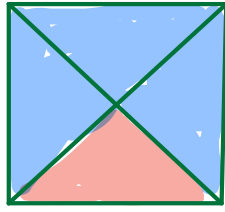


## Critical Regions

A 4 sided spinner has sides coloured red, blue, blue and blue



If fair then  $p(\text{red}) = \frac{1}{4}$

Using a test of 20 trials, carry out a hypothesis test that the spinner is unfair at the 10% significance level. Determine the critical region.

Two tailed test 5% each end.

$$X \sim B\left(20, \frac{1}{4}\right)$$

$$P(X \leq 0) = 3.1 \times 10^{-3} < 5\%$$

$$P(X \leq 1) = 0.0243 < 5\%$$

$$P(X \leq 2) = 0.0912 > 5\%$$

$$P(X \leq 3) = 0.2251$$

0, 1 in critical region

$$P(X \geq 9) = 1 - P(X \leq 8)$$

$$= 1 - 0.9591 = 0.0409 < 5\%$$

$$P(X \geq 8) = 1 - P(X \leq 7)$$

$$= 1 - 0.8982 = 0.1018 > 5\%$$

9, 10, ..., 20 in critical region

Critical region

$$= \{0, 1, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20\}$$

or  $\{x : x \leq 1\} \cup \{x : x \geq 9\}$

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