Answer on Question # 41822, Math, Statistics and Probability

The values below are the scores (maximum 20) obtained in an aptitude test by a random sample of 11 graduates. It is known that for the non-graduate population the median score is 12. Is there evidence, at the 10% significance level, that graduate achieve a higher median score than the non-graduate population?

14 15 09 10 10 13 14 19 12 16 13

Solution:

1) $H_0: \eta = 12$

2) $H_1: \eta > 12$ (one-tailed)

3) $\alpha = 0.10$ – significance level

4) Signs of (score – 12) are:

$$+ + - - - + + + 0 + +$$

5) Let X denote the number of + signs. Then, ignoring the one 0 in this case, under H_0,

$$X \sim B(10, 0.5) \; with \; observed \; value \; of \; X = 7.$$

6) $B(10, 0.5)$ – binomial distribution with parameters 10 and 0.5

7) $P(X \geq 7) = \sum_{i=7}^{10} \binom{10}{i} 0.5^i 0.5^{10-i} = \frac{1}{1024} \sum_{i=7}^{10} \binom{10}{i} = \frac{1}{1024}(120 + 45 + 9 + 1) =$

$$= \frac{185}{1024} \approx 0.18 > \; 0.1$$

Answer:

Thus there is no evidence, at the 10% level of significance, to suggest that graduates achieve a higher median score than the non-graduate population.