

Test #3

Please, write clearly and justify all your steps, to get proper credit for your work. You are allowed to use the textbook and your hand calculator. You are supposed to use the statistical tables from the book to solve the problems below.

(1)[4 Pts] Let X have the p.d.f. $f(x) = \frac{3}{4}(1 - x^2)$, $-1 \leq x \leq 1$.

(a) Compute the mean and the variance of X .

(b) Compute $P(0 < X < \frac{1}{2})$.

(2)[4 Pts] Let \bar{X} be the mean of a random sample of size $n = 27$ from the uniform distribution in the interval $[0, 6]$, that is, $f(x) = \frac{1}{6}$ for $0 \leq x \leq 6$. Approximate the probability $P(2.7 < \bar{X} < 3.2)$.

(3)[4 Pts] Two textiles are compared for tensile strength. A sample of 13 specimens, 7 from textile A and 6 from textile B was tested and the tensile strengths measured (in units of 100 lb per inch²) are:

A: 32, 30, 33, 31, 34, 32, 32

B: 33, 35, 36, 37, 34, 35

Calculate the 99 percent confidence interval for the difference of the mean tensile strength of the two textiles.

(4)[4 Pts] Two detergents are tested for their ability to remove stains. It was found that detergent A was successful in 63 out of 91 independent trials; detergent B was successful in 42 out of 79 independent trials. Compute the 90 percent confidence interval for the $p_A - p_B$, the difference of the true proportions of success. What can you conclude?

(5)[4 Pts] Suppose that a possible gubernatorial candidate wants to assess initial support among voters before announcing his/her candidacy. From a poll of n voters selected at random, the candidate would like the estimate of the proportion of favourable votes to be within 0.03 of the true proportion p . If the decision will be based on a 95 percent confidence interval, how large should n be?