JOMO KENYATTA UNIVERSITY
OF
AGRICULTURE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS 2018/2019 ACADEMIC YEAR.

STA 2301: TESTS OF HYPOTHESIS CAT

DATE: March 7, 2019 TIME: 1 HOUR

INSTRUCTIONS: Attempt ALL questions.

(a) Given that $\bar{X} \geq 2$ is the critical region for the testing the null hypothesis that $H_0 : \theta = 3$ against the alternative that $H_1 : \theta = 2$ on the basis of a single observation from the population $f(x, \theta) = \theta e^{-\theta x}$ for $0 \leq X \leq \infty$. Compute

(i) pr(Type I error)

(ii) pr(Type II error)

(6 marks)

(b) Let X be a normally distributed random variable with an unknown mean and a variance of 100. A random sample of size 34 is chosen form this population. If the critical region is given by $\omega = \{X : \bar{x} > 80\}$ and the hypothesis to be tested is; $H_0 : \mu = 75$ against $H_0 : \mu > 75$, Determine;

(i) The power function for the test

(ii) The significant level of the test

(iii) The sample size that would make this test to be of size 0.05.

(12 marks)

(c) State without any proof, the Neyman-Pearson Lemma and explain carefully the circumstance(s) under which it is most appropriate.

(6 marks)

(d) A pharmaceutical company has installed a machine which fills automatically 5gms of drug in each phial. A random sample of 16 phials was taken and it was found to contain 5.08 gms on an average in a phial. The standard deviation of the sample was 0.12 gms. Test whether the machine is in order at 5% significance level.

(6 marks)