King Fahd University of Petroleum & Minerals

Mathematics & Statistics Department

STAT 319: Probability & Statistics for Engineers & Scientists

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Term 161

First Major Exam

Thursday 13/10/2016

6:00 – 7:00 PM

Please circle your instructor name:

Anabosi Al-Sawi Saleh Samuh

Std. Name: _____ Std. ID: _____ Serial No.: _____

Question No.	Full Mark	Marks Obtained
1.	9	
2.	5	
3.	6	
4.	7	
5.	13	
Total	**40**	

Q1]. . . [9 points] Samples of a cast aluminum part are classified on the basis of surface finish (either good or excellent) and length measurements (either good or excellent). From past experience it's known that 83% has excellent surface finish. Moreover, 90% has excellent length, also 7% has both good surface finish and good length. A part is selected randomly,

1. (2 points) What is the sample space for this experiment?

2. (2 points) What is the probability that the selected part has excellent surface finish and good length?

3. (2 points) If the selected part has good length, what is the probability that the surface finish is excellent?

4. (3 points) Are the events "excellent surface" and "excellent length" independent? Explain.

Q2]. . . [5 points] Each relay in the following circuit will close with probability 0.8. If all relays function independently, what is the probability that a current flows between A and B?

Q3]. . . [6 points] The alignment between the magnetic tape and the head in a magnetic tape storage system affects the performance of the system. Suppose that 10% of the read operations are degraded by skewed alignments, 5% are degraded by off-center alignments, and the remaining read operations are properly aligned. The probability of a read error is 0.01 from a skewed alignment, 0.02 from an off-center alignment, and 0.001 from a proper alignment.

1. (4 points) What is the probability of a read error?

2. (2 points) If a read error occurred, what is the probability that it was due to a skewed alignment?

Q4]. . . [7 points] It is known that diskettes produced by a certain company will be defective with probability 0.01, independent of each other. The company sells the diskettes in packages of size 10 and offers a money-back guarantee that at most 1 of the 10 diskettes in the package will be defective.

1. (4 points) What is the probability that a package is returned?

2. (3 points) If someone buys 3 packages, what is the probability that he or she will return exactly 1 of them?

Q5]. . . [13 points] Let X be a random variable with the probability mass function

$$f(x) = \begin{cases} c(x^2+4) & \text{for } x = 0, 1, 2, 3 \\ \\ 0 & \text{otherwise} \end{cases} .$$

1. (3 points) Find the value of c that makes this function a valid probability mass function.

2. (3 points) Find the cumulative distribution function of the random variable X.

3. (4 points) Find $P(X > E(X))$.

4. (3 points) Find $F(3.2) - F(1.7)$, where F is the cumulative distribution function of X.

GOOD LUCK