

King Fahd University of Petroleum and Minerals
Department of Mathematics
Stat 319
Major Exam I
233
July 11, 2024
Net Time Allowed: 90 Minutes

USE THIS AS A TEMPLATE

Write your questions, once you are satisfied upload this file.

1. A part selected for testing is equally likely to have been produced on any one of six cutting tools. The probability that the part is from tool 3 or tool 5?

- (a) 0.333
- (b) 0.167
- (c) 0.500
- (d) 0.833
- (e) 0.667

2. The analysis of shafts for a compressor is summarized by conformance to specification.

		Round Conforms	
		Yes	No
Surface finish conforms	Yes	345	5
	No	12	8

If a shaft is selected at random, what is the probability that the selected shaft conforms to surface finish requirements or to roundness requirements?

- (a) 0.9784
- (b) 0.9676
- (c) 0.9811
- (d) 0.0126
- (e) 0.0676

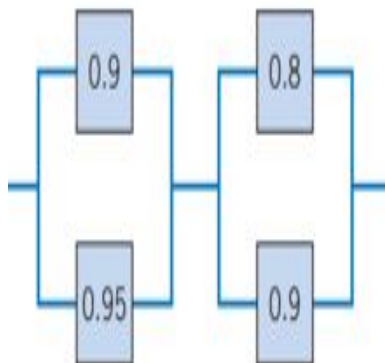
3. The analysis of shafts for a compressor is summarized by conformance to specification.

		Round Conforms	
		Yes	No
Surface finish conforms	Yes	345	5
	No	12	8

If a shaft is selected at random, what is the probability that the selected shaft conforms to surface finish requirements given that it does not conform to roundness requirements?

- (a) 0.3846
(b) 0.6154
(c) 0.0143
(d) 0.4000
(e) 0.6076
4. A lot of 100 semiconductor chips contains 20 that are defective. Two are selected randomly, without replacement, from the lot. What is the probability that both are defective?
- (a) 0.0384
(b) 0.025
(c) 0.25
(d) 0.2424
(e) 0.0625

5. The following circuit operates if and only if there is a path of functional devices from left to right. The probability that each device functions is as shown. Assume that the probability that a device is functional does not depend on whether or not other devices are functional. What is the probability that the circuit operates?



- (a) 0.9751
 (b) 0.3360
 (c) 0.8574
 (d) 0.2880
 (e) 0.4321
6. Let $f(x) = c \left(\frac{1}{2}\right)^x$, $x = 1, 2, 3$. Determine the value of the constant c so that the function $f(x)$ satisfies the conditions of being a probability mass function
- (a) $\frac{8}{7}$
 (b) $\frac{1}{8}$
 (c) 1
 (d) $\frac{7}{8}$
 (e) There is no c satisfies the conditions of being a probability mass function

7. If $f(x) = \frac{2x + 1}{25}$, $x = 0, 1, 2, 3, 4$, then $P(X > 1 | X < 3) =$

- (a) 0.56
- (b) 0.20
- (c) 0.36
- (d) 0.15
- (e) 0.50

8. In a NiCd battery, a fully charged cell is composed on Nickelic Hydroxide. Nickel is an element that has multiple oxidation states that is usually found in the following states:

Nickel Charge	Proportion found
0	0.17
+2	0.35
+3	0.33
+4	0.15

The probability of the positive nickel-charged options within one standard deviation from the mean

- (a) 0.68
- (b) 0.35
- (c) 0.33
- (d) 0.85
- (e) 0.15

9. Each sample of water has a 10% chance of containing a particular organic pollutant. Assume that the samples are independent with regard to the presence of the pollutant. Find the probability that in the next 18 samples, at least three samples contain the pollutant.

- (a) 0.2662
- (b) 0.7338
- (c) 0.0982
- (d) 0.9018
- (e) 0.4163

10. Errors in an experimental transmission channel are found when the transmission is checked by a certifier that detects missing pulses. The number of errors found in an eight-bit byte is a random variable with the following distribution

$$F(x) = \begin{cases} 0 & X < 1 \\ 0.7 & 1 \leq x < 4 \\ 0.9 & 4 \leq x < 7 \\ 1 & x \geq 7 \end{cases}$$

Then $P(X > 3) =$

- (a) 0.3
- (b) 0.7
- (c) 0.9
- (d) 0.1
- (e) 0.2

11. The number of errors in a textbook follows a Poisson distribution with a mean of 0.01 error per page. What is the probability that there are three or less errors in 100 pages?
- (a) 0.9810
 - (b) 1
 - (c) 0
 - (d) 0.6131
 - (e) 0.2453
12. A sample of size eight measurements were made on the inside diameter of forged piston rings used in an automobile engine. The data (in millimeters) are 74.001, 74.002, 74.014, 74.002, 74.005, 74.002, 74.005, and 74.004. If A is the estimator of the population mean, B is the estimator of the population standard deviation, then $A - B$ is given by
- (a) 74.00020
 - (b) 74.00438
 - (c) 0.004173
 - (d) 0
 - (e) 0.00020

13. The following data on the motor fuel octane ratings of several blends of gasoline:

82 83 85 85 86 87 87 89 89 89 89 89 90 90 91 92 94 94 96 98

The 90th percentile equal to

- (a) 95.8
- (b) 94.2
- (c) 94
- (d) 96
- (e) 95

14. You are told that the minimum, 1st, 2nd, 3rd quartiles and the maximum for a set of 100 distance (in meters) achieved by a particular brand of golf ball in the overall distance test are 210, 251, 260, 275 and 295

Which of the following statements is true?

- (a) The data contain outliers because the minimum distance is less than the limit for outliers
- (b) The data contain outliers because the maximum distance is more than the limit for outliers
- (c) The right whisker is longer than the left whisker
- (d) The inter quartile range is approximately 10 yards
- (e) The data are symmetric