King Fahd University of Petroleum and Minerals
Department of Mathematics
STAT 201
Exam 2
Term 252
April 06, 2026
Net Time Allowed: 120 Minutes

MASTER VERSION

1. (Exercise 4 - 6) Suppose that $f(x) = e^{-(x-4)}$ for $x > 4$. Determine $P(3.5 < X < 4.4)$.

   (a) 0.3297 _____ (correct)
   (b) 0.6703
   (c) 0.5934
   (d) 0.9784
   (e) 0.0180

2. (Exercise 4 - 22) The probability density function of the time you arrive at a terminal (in minutes after 8:00 a.m.) is $f(x) = e^{-x}$ for $x > 0$. Determine the cumulative distribution function of X.

   (a) $F(x) = \begin{cases} 0, & x \le 0, \\ 1 - e^{-x}, & x > 0 \end{cases}$ _____ (correct)

   (b) $F(x) = \begin{cases} 0, & x \le 0, \\ e^{-x}, & x > 0 \end{cases}$

   (c) $F(x) = 1 - e^{-x}$ for all x

   (d) $F(x) = \begin{cases} e^{-x}, & x < 0, \\ 0, & x \ge 0 \end{cases}$

   (e) $F(x) = \begin{cases} 0, & x \le 0, \\ 1 - e^{-x/2}, & x > 0 \end{cases}$

3. (Exercise 4 - 35) The thickness of a conductive coating in micrometers has a density function

$$f(x) = \begin{cases} \frac{200}{x^2}, & 100 < x < c, \\ 0, & \text{otherwise} \end{cases}$$

where c is chosen so that f is a valid probability density function. What proportion of coating thicknesses lie in the interval from $\mu - \sigma$ to $\mu + \sigma$?

(a) 0.6067 (correct)

(b) 0.6827

(c) 0.5774

(d) 0.5901

(e) 0.3033

4. (Exercise 4 - 60) Cholesterol is a fatty substance that is an important part of the outer lining (membrane) of cells in the body of animals. Its normal range for an adult is 120 – 240 mg/dl. The Food and Nutrition Institute of the Philippines found that the total cholesterol level for Filipino adults has a mean of 159.2 mg/dl and 88.1% of adults have a cholesterol level more than 113.5 mg/dl. Suppose that the total cholesterol level is normally distributed. Determine the standard deviation of this distribution.

(a) 38.7288 (correct)

(b) 38.4034

(c) 39.0598

(d) 45.7000

(e) 51.9318

5. (Suggested Problem 4 - 98) The time between the arrival of electronic messages at your computer is exponentially distributed with a mean of three hours. If you have not had a message in the last two hours, what is the probability that you do not receive a message in the next four hours?

   (a) 0.2636 _____ (correct)

   (b) 0.1353

   (c) 0.5134

   (d) 0.7364

   (e) 0.0000

6. (Suggested Problem 4 - 134) Suppose that X has a Weibull distribution with $\beta = 1.5$ and $\delta = 7.5$. Determine the value of x such that $P(X < x) = 0.95$.

   (a) 15.5858 _____ (correct)

   (b) 8.9383

   (c) 22.4680

   (d) 38.8880

   (e) 1.0354

7. (Suggested Problem 4 - 141) The length of time (in seconds) that a user views a page on a Web site before moving to another page is a lognormal random variable with parameters $\theta = 0.6$ and $\omega^2 = 1.5$. What is the probability that a page is viewed for less than 15 seconds?

   (a) 0.9573 _____ (correct)
   (b) 0.8860
   (c) 0.0427
   (d) 0.9968
   (e) 0.6810

8. (Suggested Problem 7 - 10) Suppose that the random variable X has the exponential distribution

$$f(x) = \begin{cases} 0.25\, e^{-0.25x}, & x \geq 0, \\ 0, & \text{otherwise} \end{cases}$$

   Suppose that a random sample of $n = 36$ observations is selected from this distribution. What is the approximate distribution of $2\bar{X}$?

   (a) $2\bar{X} \overset{\text{approx.}}{\sim} \mathcal{N}(\text{Mean} = 8,\ \text{Variance} = 1.7778)$ _____ (correct)
   (b) $2\bar{X} \overset{\text{approx.}}{\sim} \mathcal{N}(\text{Mean} = 8,\ \text{Variance} = 0.4444)$
   (c) $2\bar{X} \overset{\text{approx.}}{\sim} \mathcal{N}(\text{Mean} = 4,\ \text{Variance} = 0.4444)$
   (d) $2\bar{X} \overset{\text{approx.}}{\sim} \text{Exponential}(\lambda = 0.125)$
   (e) $2\bar{X} \overset{\text{approx.}}{\sim} \text{Exponential}(\lambda = 0.5)$

9. (Exercise 7 - 58) A random sample of size $n = 9$ is taken from a normal population with $\mu = 25$ and $\sigma^2 = 4$. Find the probability that the sample mean is less than 22.

   (a) Approximately 0. _____ (correct)

   (b) 0.0668

   (c) 0.2266

   (d) 0.1587

   (e) Cannot be determined since $n < 30$.

10. (Exercise 8 - 46) The sugar content of the syrup in canned peaches is normally distributed. A random sample of $n = 16$ cans yields a sample mean $\bar{x} = 23.9$ and sample standard deviation $s = 5.8$ milligrams. Calculate a 99% two-sided confidence interval for σ.

    (a) (3.9222 , 10.4724) _____ (correct)

    (b) (4.0512 , 10.8152)

    (c) (4.2830 , 8.9761)

    (d) (3.8361 , 9.9060)

    (e) (4.0143 , 11.1296)

11. (Exercise 8 - 17) The life in hours of a 75-watt light bulb is known to be normally distributed with $\sigma = 17$ hours. We want the total width of the two-sided confidence interval on mean life to be six hours at 95% confidence. What sample size should be used?

(a) 124 (correct)

(b) 123

(c) 87

(d) 31

(e) 171

12. (Exercise 8 - 28) An Izod impact test was performed on 25 specimens of PVC pipe. The sample mean is 1.35 and the sample standard deviation is 0.5. Compute a 98% confidence interval on average Izod impact strength. What is the value of the lower confidence limit?

(a) 1.1008 (correct)

(b) 1.1170

(c) 1.1436

(d) 1.0703

(e) 1.2254

13. (Exercise 8 - 25) A random sample has been taken from a normal distribution. Output from a software package is given below:

Variable	n	Mean	SE Mean	StDev	Variance	Sum
X	9	?	?	69.3	?	23010.3

Find a 95% two-sided confidence interval on the population mean. What is the value of the upper confidence limit?

(a) 2609.9686 _____ (correct)

(b) 2601.9760

(c) 2608.9522

(d) 2716.5058

(e) 2599.6660

14. (Exercise 8 - 59) The Arizona Department of Transportation wishes to survey state residents to determine what proportion of the population would like to increase statewide highway speed limits to 120 kmph from 100 kmph. How many residents do they need to survey if they want to be at least 98.36% confident that the sample proportion is within 0.13 of the true proportion?

(a) 86 _____ (correct)

(b) 85

(c) 81

(d) 58

(e) 171