**Beynəlxalq İqtisadiyyat Məktəbi**

**Statistics**

**İbrahimov İbrahim - 1005**

**FINAL EXAM QUESTIONS**

**1.** **A number of questions were posed to a random sample of visitors to a London tourist information center. For each question below, describe the type of data obtained.**

a.

b.

c.

d.

**2. Faculty at one university were asked a series of questions in a recent survey. State the type of data for each question.**

a.

b.

c.

d.

**3. Visitors to a supermarket in Singapore were asked to complete a customer service survey. Are the answers to the following survey questions categorical or numerical? If an answer is categorical, give the level of measurement. If an answer is numerical, is it discrete or continuous?**

a.

b.

c.

**4**. **A mortgage company randomly samples accounts of their time-share customers. State whether each of the following variables is categorical or numerical. If categorical, give the level of measurement. If numerical, is it discrete or continuous?**

a.

b.

c.

d.

**5. Residents in one housing development were asked a series of questions by their homeowners’ association. Identify the type of data for each question.**

a.

b.

c.

d.

**6. Determine an appropriate interval width for a random sample of 110 observations that fall between and include each of the following:**

a.30 to 70

b.

c.

d.

**7. Consider the following data:**

59 62 15 65

39 41 35 15

39 32 36 37

62 15 65 56

13 54 64 17

a. Construct a frequency distribution.

b. Construct a histogram.

c. Construct an ogive.

d. Construct a stem-and-leaf display.

**8. The following table shows the ages of competitors in a charity tennis event in Rome:**

**Age Percent**

10–20 10

20–30 25

30–40 30

40–50 15

50+ 20

a. Construct a relative cumulative frequency distribution.

b. What percent of competitors were under the age of 35?

c. What percent of competitors were 45 or older?

**9. Consider the following frequency distribution:**

**Data: 43, 39, 29, 42, 6, 44, 22, 36, 41**

**Class:** **0 < 10, 10 < 20, 20 < 30, 30 < 40, 40 < 50**

a. Construct a frequency and relative frequency distribution.

b. Construct a cumulative frequency distribution.

c. Construct a cumulative relative frequency distribution.

**10. A sample of 20 financial analysts was asked to provide forecasts of earnings per share of a corporation for next year. The results are summarized in the following table:**

Forecast Number of Analysts

10 < 20.5 6

20.5 < 30.5 8

30.5 < 40.5 2

40.5 < 50.5 1

50.5 < 60.5 3

a. Construct the histogram.

b. Determine the relative frequencies.

c. Determine the cumulative frequencies.

d. Determine and interpret the relative cumulative frequencies.

**Mövzu 3: Using Numerical Measures to Describe Data**

**11.1. The time (in seconds) that a random sample of employees of two companies took to complete a task is:**

|  |  |  |
| --- | --- | --- |
|  | **Companies** | |
| **Number of workers** | **Company 1** | **Company 2** |
| **1** | **100** | **160** |
| **2** | **150** | **180** |
| **3** | **100** | **140** |
| **4** | **300** | **140** |
| **5** | **120** | **100** |
| **6** | **160** | **80** |
| **7** | **180** | **200** |
| **8** | **100** | **220** |

a**.** Compute mean, median, and mode for both companies and explain the differences, what do they mean.

c. Which measure of central tendency best describes the data? and why?

d. Find the standard deviation and coefficient of variation for both companies, compare and comment on standard deviation and coefficient of variation.

**11.2. This question refers to question (11.1).**

a. Find all three quartiles for both.

b. Find Interquartile range for both.

c. Find the five-number summary for both .

**12. The following data give X, the price charged per piece of table, and Y, the quantity sold (in thousands)**

Price per Piece (X) Thousands of Pieces Sold (Y)

$10 800

11 600

12 500

13 400

14 00

a. Calculate mean, variance and standard deviation for the both variables.

b. Compute covariance and correlation coefficient.

c. Comment on strength and direction of relationship between the two variables.

d. Interpret the results economically. (What does this relation economically mean).

e. Comment on strength and direction of relationship between the two variables.

**13. A random sample of data has a mean of 85 and a variance of 16.**

a. Use Chebyshev’s theorem to determine the percent of observations between 70 and 90.

b. If the data are mounded, use the empirical rule to find the approximate percent of observations between 70 and 90.

**14. Following is a random sample of seven (x, y) pairs of data points:**

(1,5), (3,7), (4,6), (5,8), (7,9), (3,6), (5,7)

a. Compute the covariance.

b. Compute the correlation coefficient.

**15. Consider the following sample of five values and corresponding**

weights:

***xi wi***

6 8

2 3

4 6

6 2

2 5

a. Calculate the arithmetic mean of the *xi* values without weights.

b. Calculate the weighted mean of the *xi* values.

**Mövzu 4 : Introduction to Probability**

|  |  |  |  |
| --- | --- | --- | --- |
| 16**. Before books aimed at preschool children are marketed, reactions are obtained from a panel of preschool children. These reactions are categorized as “favorable,” “neutral,” or “unfavorable”. Subsequently, book sales are categorized as “high,” “moderate,” or “low,” according to the norms of this market. Similar panels have evaluted 1,000 books in the past. The accompanying table shows their reactions and the resulting market performance of the books.**  **Panel Reaction** | | | |
| **Sales** | *Favorable* | *Neutral* | *Unforable* |
| *High* | 173 | 101 | 61 |
| *Moderate* | 88 | 211 | 70 |
| *Low* | 42 | 113 | 141 |

a. If the panel reaction is favorable, what is the probabaility that sales will be high?

b. If the panel reaction is unforable, what is the probabaility that sales will be low?

c. If the panel reaction is neuytral or better, what is the probability that sales will be low?

d. If sales are low, what is the probability that the panel reaction was neutral or better?

**17. A department store manager has monitored the number of complaints recieved per week about poor service. The probabilities for numbers of complaints in a week, established by this review, are shown in the following table. Let *A* be the event “There will be at least 1 compaint in a week” and *B* the event “There will be less than 10 complaints in a week.”**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of complaints | 0 | 1 to 3 | 4 to 6 | 7 to 9 | 10 to 12 | More than 12 |
| Probability | 0.14 | 0.39 | 0.23 | 0.15 | 0.06 | 0.03 |

a. Find the probability of A and B.

b. Find the probability of the Complement of A and B.

c. Find the probability of union and intersaction of A and B.

d. Are the events mutually exlusive? Calculate and explain

e. Are the events A and B collectively exhaustive? Calculate and explain

f. Are the events A and B independent?

**18. A corporation takes delivery of some new machinery that must be installed and checked before it becomes available to use. The corporation is sure that it will take no more than 7 days for this installation and check to take place. Let A be the event “it will be more than 4 days before the machinery becomes available” and B be the event “it will be less than 6 days before the machinery becomes available.”**

a. Describe the event that is the complement of event A.

b. Describe the event that is the intersection of events A and B.

c. Describe the event that is the union of events A and B.

d. Are events A and B mutually exclusive?

e. Are events A and B collectively exhaustive?

f. Show that (A ᴖ B) ᴗ (Ā ᴖ B) = B.

g. Show that A ᴗ (Ā ᴖ B) = A ᴗ B.

**19. Consider Example 3.4, with the following four basic outcomes for the Dow Jones Industrial Average over two consecutive days:**

O1: The Dow Jones average rises on both days.

O2: The Dow Jones average rises on the first day but does not rise on the second day.

O3: The Dow Jones average does not rise on the first day but rises on the second day.

O4: The Dow Jones average does not rise on either day.

Let events A and B be the following:

A: The Dow Jones average rises on the first day.

B: The Dow Jones average rises on the second day.

a. Show that (A ᴖ B) ᴗ (Ā ᴖ B) = B.

b. Show that A ᴗ (Ā ᴖ B) = A ᴗ B.

**20. A corporation has just received new machinery that must be installed and checked before it becomes operational. The accompanying table shows a manager’s probability assessment for the number of days required before the machinery becomes operational.**

**Number of days 3 4 5 6 7**

**Probability 0.08 0.24 0.41 0.20 0.07**

**Let A be the event “it will be more than four days before the machinery becomes operational,” and let B be the event “it will be less than six days before the machinery becomes available.”**

a. Find the probability of event A.

b. Find the probability of event B.

c. Find the probability of the complement of event A.

d. Find the probability of the intersection of events A and B.

e. Find the probability of the union of events A and B.

**Mövzu 5: Discrete Probability Distributions**

21**. The number of computers sold per day at Dan’s Computer Works is defined by the following probability distribution:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **x** | **0** | **1** | **2** | **3** | **4** | **5** | **6** |
| **P(x)** | **0.05** | **0.10** | **0.20** | **0.20** | **0.20** | **0.15** | **0.10** |

1. **P( 3≤x‹6) =?**
2. **P( x›3) =?**
3. **P( 2‹x‹5) =?**

**22. Consider the probability distribution function.**

**x 0 1**

**Probability 0.40 0.60**

a. Graph the probability distribution function.

b. Calculate and graph the cumulative probability distribution.

c. Find the mean of the random variable X.

d. Find the variance of X.

**23. An automobile dealer calculates the proportion of new cars sold that have been returned a various numbers of times for the correction of defects during the warranty period. The results are shown in the following table.**

**Number of returns 0 1 2 3 4**

**Proportion 0.28 0.36 0.23 0.09 0.04**

a. Graph the probability distribution function.

b. Calculate and graph the cumulative probability distribution.

c. Find the mean of the number of returns of an automobile for corrections for defects during the

warranty period.

d. Find the variance of the number of returns of an automobile for corrections for defects during the warranty period.

**24. Given the probability distribution function:**

***X* 0 1 2**

**Probability 0.30 0.60 0.10**

a. Graph the probability distribution function.

b. Calculate and graph the cumulative probability distribution.

c. Find the mean of the random variable *X*.

d. Find the variance of *X*.

**25. Consider the probability distribution function**

***x* 0 1**

**Probability 0.40 0.60**

a. Graph the probability distribution function.

b. Calculate and graph the cumulative probability distribution.

c. Find the mean of the random variable *X*.

d. Find the variance of *X*.

26. **The profit for a production process is equal to $2,000 minus two times the number of units produced. The mean and variance for the number of units produced are 40 and 80, respectively. Find the mean and variance of the profit.**

27. **Candidates for employment at a city fire department are required to take a written aptitude test. Scores on this test are normally distributed with a mean of 280 and a standard deviation of 60. A random sample of nine test scores was taken.**

a. What is the standard error of the sample mean score?

b. What is the probability that the sample mean score is less than 280?

c. What is the probability that the sample mean score is more than 260?

d. Suppose that the population standard deviation is,in fact, 40, rather than 60. Without doing the calculations,state how this would change your answers to parts (a), (b), and (c). Illustrate your conclusions withthe appropriate graphs.

**28. Let the random variable *X* follow a normal distribution with µ = 60 and σ2 = 121.**

a. Find the probability that *X* is greater than 50.

b. Find the probability that *X* is greater than 70 and less than 80.

c. Find the probability that *X* is less than 60.

e. Demonstrate your understanding on Normal and Standard Normal distribution, its mean and variance

**29. The jurisdiction of a rescue team includes emergencies occurring on a stretch of river that is 4 miles long. Experience has shown that the distance along this stretch, measured in miles from its northernmost point, at which an emergency occurs can be represented by a uniformly distributed random variable over the range 0 to 4 miles. Then, if *X* denotes the distance (in miles) of an emergency from the northernmost point of this stretch of river, its probability density function is as follows:**



1. Graph the probability density function.
2. Find and graph the cumulative distribution function.
3. Demonstrate your understanding on Uniform distribution (uniform distribution, its density function, mean and variance)

**30.The incomes of all families in a particular suburb can be represented by a continuous random variable. It is known that the median income for all families in this suburb is $50,000 and that 30% of all families in the suburb have incomes above $82,000.**

a. For a randomly chosen family, what is the probability that its income will be between $60,000 and$82,000?

b. Given no further information, what can be said about the probability that a randomly chosen familyhas an income below $50,000?

**31. At the beginning of winter, a homeowner estimates that the probability is 0.5 that his total heating bill for the three winter months will be less than $480. He also estimates that the probability is 0.6 that the total bill will be less than $560.**

a. What is the probability that the total bill will be between $480 and $560?

b. Given no further information, what can be said about the probability that the total bill will be less than $500?

**32. The ages of a group of executives attending a convention are uniformly distributed between 30 and 60years. If the random variable *X* denotes ages in years, the probability density function is as follows:**

***f*(*x*)=**

a. Graph the probability density function for *X*.

b. Find and graph the cumulative distribution functionfor *X*.

c. Find the probability that the age of a randomlychosen executive in this group is between 40 and50 years.

d. Find the mean age of the executives in the group.

**33. The random variable *X* has probability density function as follows:**

**f(x) =**

a. Graph the probability density function for *X*.

b. Show that the density has the properties of a proper probability density function.

c. Find the probability that *X* takes a value between 0.5 and 1.5.

**34. Let the random variable *Z* follow a standard normal distribution.**

a. The probability is 0.70 that *Z* is less than what number?

b. The probability is 0.25 that *Z* is less than what number?

c. The probability is 0.2 that *Z* is greater than what number?

d. The probability is 0.6 that *Z* is greater than what number?

**35. An industrial plant in Britain with 2,000 employees has a mean number of lost-time**

**Accidents per week equal to λ = 0.4, and the number of accidents follows a Poisson**

**distribution. What is the probability that the time between accidents is less than**

**2 weeks?**

**36. Judy Chang, the account manager for Northern Securities, has a portfolio that includes**

**200 shares of Allied Information Systems and 300 shares of Bangalore Analytics. Both**

**Firms provide Web-access devices that compete in the consumer market. The price of**

**Allied stock is normally distributed with mean E(*X)* = 250 and variance**

***VAR(X)* = 810. The price of Bangalore stock is also normally distributed with the mean E(*Y)* = 400 and the VAR(*Y)* = 1210. The stock prices have a negative correlation, r *XY*= -0.40. Judy has asked you to determine the probability that the portfolio value exceeds 2,000.**

**37. iven a population with a mean of µ = 100 and a variance of σ2 = 81, the central limit theorem applies when the sample size is n ≥25. A random sample of size n = 25 is obtained.**

a. What are the mean and variance of the sampling distribution for the sample means?

b. What is the probability that ẋ > 102?

c. What is the probability that 98 ≤ ẋ ≤101?

d. What is the probability that x ≤ 101.5?

**38. Given a population with a mean of µ = 100 and a variance of σ2= 900, the central limit theorem applies when the sample size is *n* ≥25. A random sample of size *n* = 30 is obtained.**

a. What are the mean and variance of the sampling distribution for the sample means?

b. What is the probability that *ẋ*> 109?

c. What is the probability that 96 ≤ *ẋ* ≤110?

d. What is the probability that *ẋ*≤ 107?

**39. When a production process is operating correctly, the number of units produced per hour has a normal distribution with a mean of 92.0 and a standard deviation of 3.6. A random sample of 4 different hours was taken.**

a. Find the mean of the sampling distribution of the sample means.

b. Find the variance of the sampling distribution of the sample mean.

c. Find the standard error of the sampling distribution of the sample mean.

d. What is the probability that the sample mean exceeds 93.0 units?

40. **A random variable X is normally distributed with a mean of 100 and a variance of 100, and a random variable Y is normally distributed with a mean of 200 and a variance of 400. The random variables have a correlation coefficient equal to 0.5. Find the mean and variance of the random variable:**

W = 5X + 4Y

**41. The lifetimes of lightbulbs produced by a particular manufacturer have a mean of 1,200 hours and a standard deviation of 400 hours. The population distribution is normal. Suppose that you purchase nine bulbs, which can be regarded as a random sample from the manufacturer’s output.**

a. What is the mean of the sample mean lifetime?

b. What is the variance of the sample mean?

c. What is the standard error of the sample mean?

d. What is the probability that, on average, those nine lightbulbs have lives of fewer than 1,050 hours?

**42. An industrial plant in Britain with 2,000 employees has a mean number of lost-time accidents per week equal to λ = 0.4, and the number of accidents follows a Poisson distribution. What is the probability that the time between accidents is less than 2 weeks?**

**43. A client has an investment portfolio whose mean value is equal to $1,000,000 with a standard deviation of $30,000. He has asked you to determine the probability that the value of his portfolio is between $970,000 and $1,060,000 (Assume that F(–1) = 0.1587 and F(+2)= 0.0228)**

**44. It is known that amounts of money spent on clothing in a year by students on a particular campus follow a normal distribution with a mean of $380 and a standard deviation of $50.**

a. What is the probability that a randomly chosen student will spend less than $400 on clothing in a year?

b. What is the probability that a randomly chosen student will spend more than $360 on clothing in a year?

c. Draw a graph to illustrate why the answers to parts (a) and (b) are the same.

d. What is the probability that a randomly chosen student will spend between $300 and $400 on clothing in a year?

**45. A Company in Turkey with 2,000 employees has a mean number of lost-time accidents per week equal to λ = 0.5, and the number of accidents follows a Poisson distribution. What is the probability that the time between accidents is less than 2 weeks?**

**46.** **A random variable X is normally distributed with a mean of 90 and a variance of 81, and a random variable Y is normally distributed with a mean of 80 and a variance of 64. The random variables have a correlation coefficient equal to 0.4. Find the mean and variance of the random variable:**

W = 30X + 60Y

**47. Portfolio Analysis (Probability of a Portfolio)**

Ramin, the account manager for Apple Securities, has a portfolio that includes 20 shares of Allied Information Systems and 30 shares of Bangalore Analytics. Both firms provide Web-access devices that compete in the consumer market. The price of Allied stock is normally distributed with mean E(*X)*= 25 and variance *VAR(X)* = 81. The price of Bangalore stock is also normally distributed with the mean E(*Y)* = 40 and the VAR(*Y)* = 121. The stock prices have a negative correlation, r*XY*= -0.40. Ramin has asked you to determine the return (mean) and risk (standard.deviation) of this portfolio.

**48. The Cost for a production process is equal to $1,000 minus two times the number of units produced. The mean and variance for the number of units produced are 60 and 81, respectively. Find the mean and variance of the Cost.**

**49. A Plant in Austria with 3000 employees has a mean number of lost-time accidents per week equal to λ = 0.2, and the number of accidents follows a Poisson distribution. What is the probability that the time between accidents is less than 2 weeks?**

**50. Portfolio Analysis (Probability of a Portfolio)**

**Farah, the account manager for Microsoft Securities, has a portfolio that includes 40 shares of Allied Information Systems and 60 shares of Bangalore Analytics. Both firms provide Web-access devices that compete in the consumer market. The price of Allied stock is normally distributed with mean E(*X)* = 25 and variance *VAR(X)* = 64. The price of Bangalore stock is also normally distributed with the mean E(*Y)*= 40 and the *VAR* (*Y)* = 81. The stock prices have a negative correlation, r*XY*= -0.50. Farah has asked you to determine the return (mean) and risk (standard.deviation) of this portfolio.**

**51. A random sample of eight homes in a particular suburb had the following selling prices (in thousands of dollars):**

192 183 312 227 309 396 402 390

a. Assume nonnormality and find a point estimate of the population mean that is unbiased and efficient.

b. Use an unbiased estimation procedure to find a point estimate of the variance of the sample

mean. (*Hint*: Use sample standard deviation to

estimate population standard deviation).

c. Use an unbiased estimator to estimate the proportion of homes in this suburb selling for less than $250,000.

**52. Suppose that *x*1 and *x*2 are random samples of observations from a population with mean µ and variance *s*2. Consider the following three point estimators, *X*, *Y*,**

***Z*, of µ:**

X= Y= Z=

a. Show that all three estimators are unbiased.

b. Which of the estimators is the most efficient?

c. Find the relative efficiency of *X* with respect to each of the other two estimators.

**53. The Mendez Mortgage Company case study was introduced in Chapter 2. A random sample**

**of *n* = 350 accounts of the company’s total portfolio is stored in the data file Mendez Mortgage.**

**Consider the variable “Original Purchase Price.” Use unbiased estimation procedures to find point estimates of the following:**

a. The population mean

b. The population variance

c. The variance of the sample mean

d. The population proportion of all mortgages

with original purchase price of less than

$10,000

**54. A random sample of 12 employees in a large manufacturing plant found the following figures for number of hours of overtime worked in the last month:**

**22 16 28 12 18 36 23 11 41 29 26 31**

**Use unbiased estimation procedures to find point estimates for the following:**

a. The population mean

b. The population variance

c. The variance of the sample mean

d. The population proportion of employees working more than 30 hours of overtime in this plant in the last month (*n* = 12 employees).

**55.** **A random sample of 16 junior managers in the offices of corporations in a large city center was taken to estimate average daily commuting time for all such managers. Suppose that the population times have a normal distribution with a mean of 87 minutes and a standard deviation of 22 minutes.**

a. What is the standard error of the sample mean commuting time?

b. What is the probability that the sample mean is fewer than 100 minutes?

c. What is the probability that the sample mean is more than 80 minutes?

d. What is the probability that the sample mean is outside the range 85 to 95 minutes?

**56. Find the reliability factor, *z*a/2, to estimate the mean,µ, of a normally distributed population with known**

**population variance for the following.**

a. 95% confidence level

c. 80% confidence level

**57.** Find the reliability factor, *z* α /2, to estimate the mean, µ, of a normally distributed population with known

population variance for the following.

α /2 = 0.02

**58. Assume a normal distribution with known population variance. Calculate the margin of error to estimate the**

**population mean, m, for the following.**

99% confidence level; *n* = 120; s = 100

Calculate the margin of error to estimate the population mean

**59. Assume a normal distribution with known population variance. Calculate the width to estimate the population mean, m, for the following.**

95% confidence level; *n* = 120; s = 25

**60. Assume a normal distribution with known population variance. Calculate the LCL and UCL for each of the following.**

*x* = 510; *n* = 485; σ = 50; a = 0.10

**61. It is known that the standard deviation in the volumes of 20-ounce (591-millliliter) bottles of natural spring water bottled by a particular company is 5 millliliters. One hundred bottles are randomly sampled and measured.**

a. Calculate the standard error of the mean.

b. Find the margin of error of a 90% confidence interval estimate for the population mean volume.

c. Calculate the LCL, UCL and the width for a 98% confidence interval for the population mean volume.

**62. A college admissions officer for an MBA program has determined that historically applicants have undergraduate grade point averages that are normally distributed with standard deviation 0.45. From a random sample of 25 applications from the current year, the sample mean grade point average is 2.90.**

a. Find a 95% confidence interval for the population mean.

b. Based on these sample results, a statistician computes for the population mean a confidence interval extending from 2.81 to 2.99. Find the confidence level associated with this interval.

**63. Find the standard error to estimate the population mean for each of the following.**

*n* = 25; 90% confidence level; *s*2 = 43

**64.** Calculate the margin of error to estimate the population mean for each of the following (variance is unknown).

90% confidence level;

*x*1 = 15; *x*2 = 17; *x*3 = 13; *x*4 = 11; *x*5 = 14

**65. Find the LCL and UCL for each of the following.**

1 - a = 0.98; *n* = 22; *x* = 58; *s* = 15

**66. A random sample of 15 tires was tested to estimate the average life of this type of tire under normal driving conditions. The sample mean and sample standard deviation were found to be 500 miles and 200 miles, respectively.**

a. Calculate the margin of error for a 95% confidence interval estimate of the mean lifetime of this type of tire if driven under normal driving conditions.

b. Find the UCL and the LCL of a 90% confidence interval estimate of the mean lifetime of this type of tire if driven under normal driving conditions.

**67. Calculate the width for each of the following.**

*n* = 25; *s* = 50; α = 0.10

**68. Find the margin of error to estimate the population proportion for each of the following.**

*n* = 500; *ϸ* = 0.05; . α = 0.10

**69. Calculate the confidence interval to estimate the population proportion for each of the following.**

a = 0.04; *n* = 265; *p*n = 0.50

**70. A business school placement director wants to estimate the mean annual salaries 10 years after students graduate. A random sample of 25 such graduates found a sample mean of $740 and a sample standard deviation of $780. Find a 90% confidence interval for the population mean, assuming that the population distribution is normal.**

**71. The production manager of Northern Windows, Inc., has asked you to evaluate a proposed new procedure for producing its Regal line of double-hung windows. The present**

**process has a mean production of 80 units per hour with a population standard**

**deviation of σ= 8. The manager does not want to change to a new procedure unless**

**there is strong evidence that the mean production level is higher with the new process.**

**72. Demonstrate your understanding on interpretation of the Probability Value, or p-Value.**

**73. The production manager of Circuits Unlimited has asked for your assistance in analyzing**

**a production process. This process involves drilling holes whose diameters are**

**normally distributed with a population mean of 2 inches and a population standard**

**deviation of 0.06 inch. A random sample of nine measurements had a sample mean of**

**1.95 inches. Use a significance level of a = 0.05 to determine if the observed sample**

**mean is unusual and, therefore, that the drilling machine should be adjusted.**

**74. A random sample is obtained from a population with variance σ2 = 625, and the sample mean is computed.**

**Test the null hypothesis *H*0 : µ = 100 versus the alternative hypothesis *H*1 : µ ›100 with α = 0.05. Compute**

**the critical value *xc* and state your decision rule for the following options.**

a. Sample size *n* = 16

b. Sample size *n* = 32

**75. Demonstrate your understanding on Unbiased Estimator, Most Efficient Estimator and Relative Efficiency**