University of Toronto Scarborough
STAB22 Final Examination

April 2008

For this examination, you are allowed two handwritten letter-sized sheets of notes (both sides) prepared by you, a non-programmable, non-communicating calculator, and writing implements.

This question paper has 16 numbered pages; before you start, check to see that you have all the pages. There are statistical tables at the back.

This examination is multiple choice. Each question has equal weight, and there is no penalty for guessing. On the Scantron answer sheet, ensure that you enter your last name, first name (as much of it as fits), and student number (in "Identification").

Mark in each case the best answer out of the alternatives given (which means the numerically closest answer if the answer is a number and the answer you obtained is not given.)

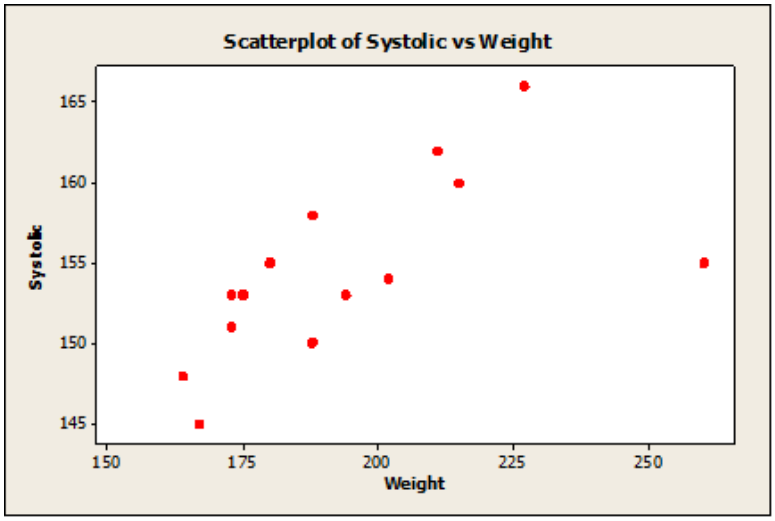
If you need paper for rough work, use the back of the sheets of this question paper. The question paper will be collected at the end of the examination, but any writing on it will not be read or marked.

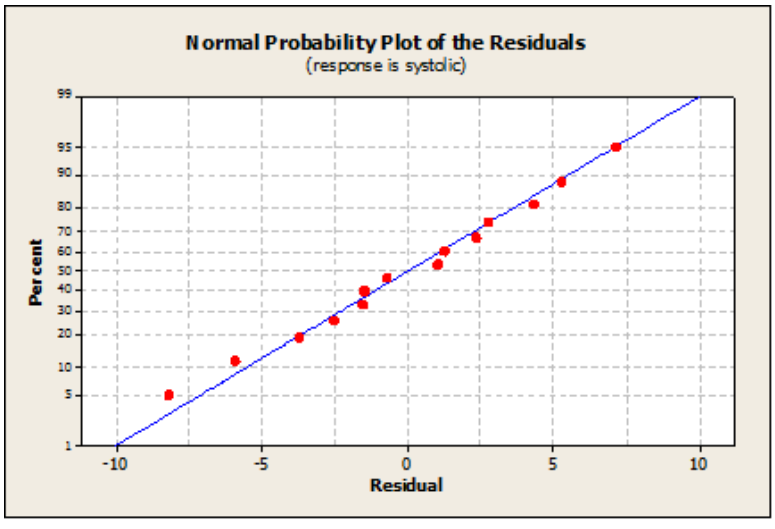
Before you begin, two things:

- Check that the colour printed on your Scantron sheet matches the colour of your question paper. If it does not, get a new Scantron from an invigilator.
- Complete the signature sheet, but *sign it only when the invigilator collects it.* The signature sheet shows that you were present at the exam.

1. Systolic blood pressure readings of individuals are thought to be related to weight. The following MINITAB output was obtained from a regression analysis of systolic blood pressure on weight (in pounds). Use this information to answer this question and the next question. Answer these questions assuming that the regression model given in the in the MINITAB output is appropriate.

```
Descriptive Statistics: Systolic, Weight

Variable   N  N*    Mean  SE Mean  StDev  Minimum      Q1  Median      Q3
Systolic  14   0  154.50     1.49   5.57   145.00  150.75  153.50  158.50
Weight    14   0  194.07     7.18  26.86   164.00  173.00  188.00  212.00


Correlations: Systolic, Weight

Pearson correlation of Systolic and Weight = 0.635

The regression equation is
Systolic = 129 + 0.132 Weight

Predictor        Coef       StDev          T        P
Constant      128.935       9.055      14.24    0.000
Weight        0.13173     0.04625       2.85    0.015
```





Which of the following statements based on the above information is true?

(a) none of the other statements is true

(b) * an increase of 10 pounds in weight is accompanied by an average increase of 1.32 in systolic blood pressure where systolic blood pressure is measured in the same units as in data.

(c) the normal probability plot of residuals shows that the residuals have a clearly non-normal distribution.

(d) more than one of the other statements is true.

(e) more than 60% of the variation in systolic blood pressure has been accounted for by the linear relationship with weight.

2. Using the information in Question 1 above, which of the following statements is true?

(a) * none of the other statements is true

(b) more than one of the other statements is true.

(c) If we omit the heaviest person from the data set, the correlation between weight and systolic blood pressure will be less than 0.635.

(d) In the data above, the weight is measured in pounds. If we convert these weights to kilograms (1 pound = 0.454 kg), then the estimated slope of the regression of systolic blood pressure on weight will become 0.132×0.454.

(e) If we omit the heaviest person from the data set, the slope of the least-squares line (regressing systolic on weight) will be less than 0.132.

3. A statistics class had 60 female students and 40 male students. MINITAB descriptive statistics of the scores on the final exam for this class are given below:

```
Descriptive Statistics: Score

Sex        N    Mean  SE Mean  StDev  Minimum     Q1  Median     Q3  Maximum
Female    60   63.70     2.02  15.68    30.00  50.00   60.00  77.50    92.00
Male      40   57.35     1.98  12.52    24.00  50.00   60.00  60.00    80.00
```

The class average, (i.e. the mean of all 100 students) to the nearest single decimal place is:

(a) This cannot be calculated from the information given

(b) 63.0

(c) 60.0

(d) * 61.2

(e) 60.5

4. A gasoline tank for a certain car is designed to hold 15 gallons of gas. Suppose that the actual capacity of a randomly selected tank has a normal distribution with a mean of 15.0 gallons and a standard deviation of 0.15 gallons. Use this information for this question and the following one.

The manufacturer of this gasoline tank considers the largest 2% of these tanks as too large to put on the market. What is the minimum capacity (in gallons, rounded to two decimal places) that will be considered as too large?

(a) 16.00 gallons

(b) 15.72 gallons

(c) * 15.31 gallons

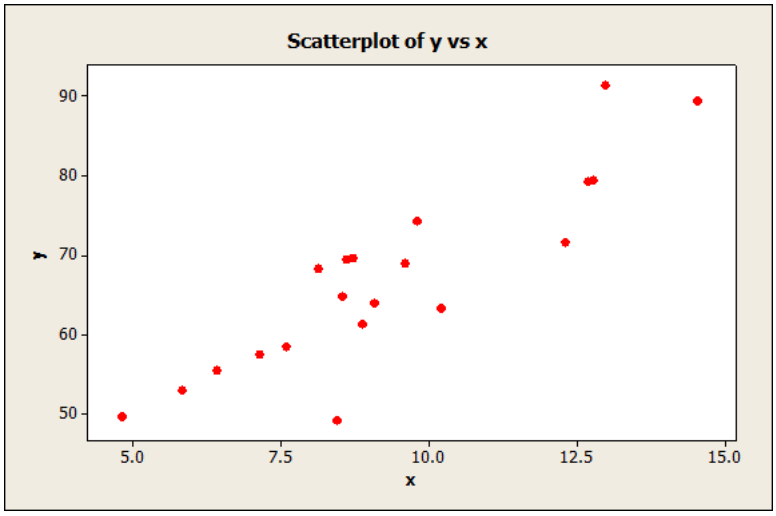
(d) 15.00 gallons

(e) 15.98 gallons

5. Using the information in Question 4, if a simple random sample of four tanks is selected, and their capacities can be considered independent, what is the probability that all of these four tanks will hold between 14.75 and 15.10 gallons of gas? (round your answer to the two decimal places)

   (a) 0.50
   (b) 0.70
   (c) * 0.24
   (d) 0.91
   (e) 0.99

6. Two variables x and y are related to each other. A scatterplot and some Minitab output is shown below. Use this information for this question and the two following.




```
Descriptive Statistics: x, y

Variable   N  N*   Mean  SE Mean  StDev  Minimum     Q1  Median      Q3
x         20   0  9.346    0.578  2.583    4.802  7.708   8.785  11.773
y         20   0  66.91     2.65  11.84    49.19  57.76   66.51   73.62

Regression Analysis: y versus x

The regression equation is
y = 28.8 + 4.08 x
```

What is the predicted value of y when $x = 25$?

   (a) between 90 and 110
   (b) 28.8
   (c) * we should not use the regression line because this is extrapolation
   (d) 4.08
   (e) 130.8

7. Using the information in Question 6, what is the value of the correlation coefficient between x and y?

(a) * 0.89

(b) bigger than 1

(c) about 0.75

(d) very close to 1

(e) cannot tell from the information available

8. Look again at the information in Question 6. Suppose that you did not have the equation of the regression line (and you didn't want to calculate it). You are given that $x = 12$ for a new observation (not in the original data set). What can you say about the value of y for this new observation?

   (a) * it is probably bigger than 67

   (b) it must be bigger than 67

   (c) it must be smaller than 67

   (d) it is probably smaller than 67

9. A test of significance is being carried out of $H_0 : \mu = 50$ against $H_a : \mu \neq 50$, for a normal-shaped population with standard deviation $\sigma = 6$. A random sample of 9 observations is drawn from the population, and the sample mean is $\bar{x} = 53$. Which of the following values best describes the P-value?

   (a) somewhere between 0.10 and 0.20, cannot be more accurate

   (b) bigger than 0.20

   (c) less than 0.05

   (d) 0.07

   (e) *0.13

10. The random variable X has this probability distribution:

Value	1	2	5
Probability	0.5	0.4	0.1

The random variable Y has this probability distribution:

Value	1	3
Probability	0.3	0.7

What is the mean of the random variable $X + Y$?

   (a) 2.4

   (b) 1.8

   (c) 3

   (d) * 4.2

11. A machine for manufacturing tennis balls is supposed to produce balls with a mean weight of 57.6 grams. The weights of tennis balls produced by this machine have a distribution that is very close to normal. A sample of 3 tennis balls produced balls with a sample mean weight of 57.3 grams and a sample SD of 0.1 grams. The company manufacturing the tennis balls wants to know if there is any evidence in this sample that the mean weight of balls produced by this machine differs from 57.6 grams. Using suitable hypotheses and a suitable test, obtain a P-value for assessing the evidence. Which of the following intervals contains your P-value?

   (a) there is no need to calculate a P-value because 57.3 is different from 57.6.

   (b) between 0.01 and 0.02

   (c) less than 0.01

(d) greater than 0.05

(e) * between 0.02 and 0.05

12. A researcher wants to calculate a 95% confidence interval for a population mean, based on a sample of size 200, but is worried that the population distribution is a little skewed. What advice would you give in this situation?

    (a) * it is reasonable to calculate the confidence interval because the sample size is large

    (b) it is reasonable to calculate the confidence interval because the shape of the distribution does not matter

    (c) the confidence interval can only be calculated if the distribution has a normal shape

    (d) it depends on the actual numbers

13. We are interested in estimating the mean Math SAT score μ for the population of high-school seniors from a large metropolitan area school district. Suppose we know that the standard deviation of the population of Math SAT scores for seniors in the district is 100. Assume that the population of Math SAT scores for seniors in the district is approximately normally distributed.

    Which of the following would produce a confidence interval with the smallest margin of error?

    (a) using a sample of 25 seniors with a confidence level of 90%

    (b) * using a sample of 35 seniors with a confidence level of 85%

    (c) using a sample of 25 seniors with a confidence level of 85%

    (d) using a sample of 35 seniors with a confidence level of 90%

    (e) using a sample of 35 seniors with a confidence level of 95%

14. One part of the stock market is called the "over-the-counter market". One way of measuring activity in a stock market is by the percentage of outstanding shares traded. On a particular day, the results for 40 shares were as shown in the stemplot below:

```
Stem-and-leaf of C1  N  = 40
Leaf Unit = 1.0

(22)  0  1111111112222222222
 18   0  444444455555
 6    0  66777
 1    0
 1    1
 1    1
 1    1
 1    1
 1    1
 1    2
 1    2  3
```

    What is the median of this distribution?

    (a) 20

    (b) 2.3

    (c) * 2

    (d) 0.2

    (e) 6

15. In the data of Question 14, how do the mean and median compare?

    (a) It is impossible to compare the mean and median from this information.

    (b) The median is bigger than the mean

    (c) * The mean is bigger than the median

    (d) The mean and median are about the same

16. Which of the following statements about the correlation coefficient between two quantitative variables X and Y is true?

    (a) * the correlation coefficient is a unitless measure of the strength of the linear relationship between X and Y and must always lie between -1.0 and $+1.0$, inclusive.

    (b) if the correlation coefficient is equal to 0, then X and Y are not related.

    (c) if all the points on the scatterplot of Y versus X lie on a perfectly horizontal straight line, then the correlation coefficient must be $+1$.

    (d) the correlation coefficient is a measure of the strength of the linear relationship between two quantitative variables that is resistant to outliers.

    (e) none of the other statements is true.

17. Let μ denote the hourly wage for workers who provide hotel room service in a large city. A 95% confidence interval for μ based on a large sample of workers, assuming the wages to have a normal distribution with a known standard deviation, is from \$9.50 to \$10.90. Use this information for this question and the next one.

    Based on this information, a 90% confidence interval for μ based on this sample (rounded to the nearest \$0.10, e. g. 9.46 is 9.50, 9.44 is 9.40, 9.55 is 9.60) is:

    (a) * (\$9.60, \$10.80)

    (b) (\$9.40, \$11.00)

    (c) (\$9.70, \$10.70)

    (d) (\$9.50, \$10.90)

    (e) (\$9.80, \$10.60)

18. Based on the information in Question 17, which of the following numbers is the closest to the value of the test statistic (z) for testing for testing $H_0 : \mu = 9.2$ versus $H_a : \mu \neq 9.2$?

    (a) 3.0

    (b) 2.6

    (c) * 2.8

    (d) 2.0

    (e) 2.4

19. A gambling game consists of tossing a fair coin and, independently, rolling a fair die. (A toss of a fair coin produces a Head or a Tail, each with probability $\frac{1}{2}$, and a roll of a fair die gives a score of 1, 2, 3, 4, 5 or 6 each with probability $\frac{1}{6}$.) The gambler's score is the score on the die (between 1 and 6 inclusive) plus 3 if the coin comes up Heads and plus 1 if the coin comes up Tails. The gambler wins if the total score is 7 or more. What is the probability that the gambler wins?

    (a) $\frac{1}{12}$

    (b) * $\frac{1}{3}$

    (c) $\frac{1}{4}$

(d) $\frac{1}{2}$

20. A study is to be made, comparing a promising new medical treatment with a control. How would you recommend that the researchers decide which subjects receive which treatment?

    (a) Each subject who receives the treatment should be matched up with a subject of the same age who is in the control group.

    (b) The subjects whose cases are most serious have the greatest need for the new treatment, and so they should receive it.

    (c) Put all the males in one group and all the females in the other.

    (d) * Use a method that does not rely on which subject is being considered, and does not rely on the researchers' judgement.

21. A coin is biased so that it has probability 0.55 of producing a head when tossed. The coin is tossed three times independently. What is the probability that there will be at least one head?

    (a) 0.09

    (b) 0.45

    (c) 0.55

    (d) 0.97

    (e) * 0.91

22. A company in northern Ontario allows people to try sled-dog racing (it offers training from experienced racers, as well as the hire of sleds and dog teams). 65% of the company's customers are male. Suppose the company takes a simple random sample of 20 of its customers. Use this information to answer this question and the following two questions.

    Use Table C to find the probability that 17 or more of the customers in the sample are male. What is this probability?

    (a) cannot be calculated from the information given

    (b) * 0.0445

    (c) 0.0323

    (d) 0.0002

23. In the situation described in Question 22, find the approximate probability that 17 or more of the company's customers are male using the normal approximation to the binomial. (You may ignore the fact that the rule of thumb is not satisfied here; do not use a continuity correction even if you happen to know about that.)

    What is the approximate probability?

    (a) 0.30

    (b) 0.01

    (c) 0.70

    (d) * 0.03

    (e) 0.045

24. In the situation described in Question 22, it is desired to make the answer obtained using the normal approximation closer to the exact answer. Which of the following would make the normal approximation more accurate?

(a) allowing in some way for the fact that the number of sampled males has to be a whole number, but the normal distribution includes decimal numbers as well

(b) sampling more than 20 customers

(c) having the proportion of males be closer to 50%

(d) * all of the other alternatives

25. In which of the following situations would you prefer to use a procedure based on the t-distribution rather than a procedure based on the normal distribution?

(a) when a population mean is being estimated and the sample standard deviation is not known

(b) when a population mean is being estimated and the population standard deviation is known

(c) when the sample size is large

(d) * when a population mean is being estimated and the population standard deviation is not known

(e) when a population proportion is being estimated

26. A student has applied for two summer jobs, a tree-planting job and a painting job. The student assesses that the probability of being offered the tree-planting job is 0.6 and the probability of being offered the painting job is 0.3. The student also believes that there is a probability (greater than zero) of being offered both jobs.

What is the probability of the student being offered either the tree-planting job or the painting job, or both?

(a) 0.18

(b) 0.9

(c) larger than 0.9

(d) * cannot be calculated from the information given

27. A set of data has median 33, first quartile 27, and smallest value 15. The third quartile has been lost. It is known, however, that the smallest value is an outlier (using the standard rule). What can you say about the third quartile?

(a) It is bigger than 39

(b) * It is less than 35

(c) It is equal to 37

(d) It must be equal to the median

28. A new housing development has a large number of apartments. These apartments are advertised as having a mean area of 1250 square feet. A tenant group thinks that the apartments are actually smaller than advertised, and hires an engineer to measure a random sample of the apartments, and carry out an appropriate test of significance. Use this information to answer this question and the next one.

What is an appropriate null hypothesis here?

(a) Population mean is greater than 1250.

(b) Population mean is less than or equal to 1250.

(c) * Population mean is equal to 1250.

(d) Population mean is not equal to 1250.

29. In the situation of Question 28, what is an appropriate alternative hypothesis?

(a) Population mean is equal to 1250

(b) Population mean is not equal to 1250

(c) * Population mean is less than 1250

(d) Population mean is less than or equal to 1250

30. You buy a stock for $5000. The stock either gains 40% or loses 30% of its value each day, each with probability 0.5. That is, the value of the stock will go up by 40% with probability 0.5 and will go down by 30% with probability 0.5. Assume that the changes in stock value on different days are independent. You plan to sell the stock after two days. What is the mean (i.e. the expected value) value of the stock after two days, rounded to the nearest $100?

(a) $4500

(b) $6000

(c) $5000

(d) none of the other choices

(e) * $5500

31. A researcher tests $H_0 : \mu = 15$ against $H_a : \mu > 15$, using $\alpha = 0.01$. The researcher obtains a P-value of 0.02. What can the researcher conclude?

(a) there is enough evidence to conclude that the population mean is bigger than 15.

(b) there is enough evidence to conclude that the population proportion is bigger than 15%.

(c) * there is not enough evidence to conclude that the population mean is bigger than 15

(d) there is not enough evidence to conclude that the population mean is different from 15

(e) there is not enough evidence to conclude that the population proportion is bigger than 15%.

32. "Durable press" cotton fabrics are treated to improve their recovery from wrinkles after washing. Unfortunately, the treatment also reduces the strength of the fabric. The breaking strength of untreated fabric is normally distributed with mean 57 pounds and standard deviation 2.3 pounds. The same type of fabric after treatment has normally distributed breaking strength with mean 30 pounds and standard deviation 1.6 pounds. A clothing manufacturer tests 5 specimens of each fabric. All 10 strength measurements are independent. What is the probability that the mean breaking strength of the 5 untreated specimens is at least 25 pounds greater than the mean strength of the 5 treated specimens? Choose the closest answer from the following options.

(a) 0.90

(b) 0.85

(c) 0.80

(d) * 0.95

(e) 0.99

33. Eight people are available to take part in an experiment. These 8 people are:

1. Chang
2. Donley
3. Jeyaraja
4. Kwok
5. Patel
6. Singh
7. Toman
8. Wong

Four of these people are to be assigned to the treatment group and four to the control group. Use the random digits below to decide which four people will be in the treatment group. Read the digits from left to right and start at the beginning of the row.

05907 50495 11384 44982 20751 27498 12069 45287 71753 90236

Which four people will be in the treatment group?

(a) 0, 5, 9 and 7.

(b) Patel, Kwok, Singh and Donley

(c) Patel, Toman, Patel again and Kwok

(d) * Chang, Kwok, Patel and Toman

34. We are trying to obtain a 90% confidence interval for the mean amount of books spent by students at a certain university. The interval is to have a margin of error of $2, and the amount spent has a normal distribution with known standard deviation of $30. How many observations will be required? Mark the closest answer out of the alternatives given.

    (a) 30

    (b) 25

    (c) 900

    (d) * 600

35. Many studies have been made on teenage smoking. In one study, the teenage subjects were given a questionnaire designed to show their level of nicotine dependence. The subjects were divided into "inhalers" (who inhaled while smoking) and "non-inhalers" (who did not inhale). The sample data obtained were as follows:

Group	Sample size	Mean score	SD of score
Inhalers	237	2.9	3.6
Non-inhalers	95	0.1	0.5

    Use the information given above for this question and the following one.

    Obtain a 95% confidence interval for the difference in mean scores between inhalers and non-inhalers. Use the conservative (safe) value for the degrees of freedom. Which of the alternatives below best describes the confidence interval?

    (a) 2.8 ± 0.8

    (b) 2.8 ± 0.3

    (c) 2.8 ± 1.2

    (d) * 2.8 ± 0.5

36. In Question 35, the score for each teenager is a value between 0 and 10. What can you say about the distribution of scores for the non-inhaling teenagers?

    (a) * it is skewed to the right

    (b) it is approximately symmetric

    (c) we do not have enough information to say

    (d) it is skewed to the left

37. An experiment is said to be biased if:

    (a) * it is conducted in such a way as to favour certain outcomes

    (b) the researcher has speculated in advance about possible outcomes to the experiment

    (c) it allows individuals with strong opinions to take part in the experiment

    (d) it allows gender or race differences in the subjects taking part in the experiment

38. Descriptive statistics and a stemplot of the scores of 32 students in a class are given below. Some of the descriptive statistics are missing, marked with `xxxx`.

```
Stem-and-leaf of c1  N  = 32
Leaf Unit = 1.0

    1    2 1
    2    2 8
    2    3
    5    3 579
    6    4 4
    8    4 69
   11    5 444
   15    5 5668
  (10)   6 0000123444
    7    6 56799
    2    7 02

Descriptive Statistics: c1

Variable          N     Mean    Median     StDev
c1               32    55.69     xxxx     12.53

Variable          Minimum    Maximum       Q1       Q3
c1                     21      72.00     50.25     xxxx
```

The instructor, disappointed that the scores came out so low, decides to increase each student's score by 20% and then add 5 points (e. g. if a student has scored 50 points, the student's grade after this transformation is $60 + 5 = 65$).

After the scores have been changed, which of the statements below will be true? (All values below are given to 2 decimal places.)

(a) this transformation will not change the median

(b) * none of the other statements is true

(c) the IQR of the transformed scores is greater than 19.00

(d) the mean will change to 66.83

(e) the standard deviation will change to 20.04

39. A simple random sample of size 100 is taken from a population with mean 50 and SD 20. The population distribution has a shape close to normal. What is the approximate probability that the sample mean is bigger than 55?

(a) 0.60

(b) 0.05

(c) * 0.01

(d) 0.40

(e) 0.10

40. The midterm test scores of a statistics class had a mean of 70 with standard deviation 5. The distribution of the scores was approximately bell shaped and so we can use the 68-95-99.7 rule.

Which of the following statements regarding the distribution of the midterm scores is true?

(a) 95% of students have their score between 55 and 85.

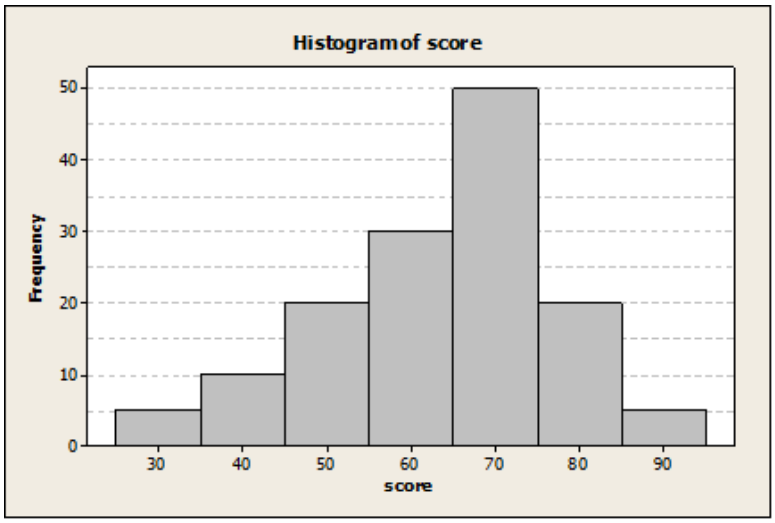
(b) less than 70% of the students have their score above 65

(c) * none of the other statements is true

(d) The interquartile range of the scores is greater than 10.

(e) more than one of the other statements is true.

41. The histogram of scores of STA220 midterm test is given below. (Note: these are hypothetical data)



Which of the following statements about the distribution of the above scores is true?

(a) The class average (i.e. the average of all students who wrote the test) is greater than 75.

(b) more than one of the other statements are true.

(c) Less than 10% of the students scored below 50 on the test

(d) none of the other statements is true

(e) * More than 50% of the students scored above 63 (i.e. grade C or above) on the test.

42. A 95% confidence interval for a population mean (μ) is from 11 to 15. What can you say about the P-value for the test of the null hypothesis $H_0 : \mu = 16$ against the one-sided alternative $H_a : \mu < 16$? It must be

(a) less than 0.05 but cannot say whether it is less than 0.025

(b) this kind of calculation can only be done for two-sided tests.

(c) greater than 0.025 but cannot say whether it is greater than 0.05

(d) * less than 0.025

(e) greater than 0.05

43. The random variable X has SD 3, and the random variable Y has SD 4. What can you say about the SD of the random variable $X + Y$?

(a) * it depends on whether X and Y are independent

(b) it depends on whether X and Y are disjoint

(c) $X + Y$ has SD 7

(d) $X + Y$ has SD 5

44. A researcher is testing whether rats can run through a maze faster if they hear classical music. The researcher divides the available rats into two groups (at random). Group 1 hears classical music as they run through the maze, while Group 2 runs through the maze without hearing classical music. The researcher measures the time it takes each rat to run through the maze. Use the above information to answer this question and the two following.

    Group 2 of rats is called:

    (a) * the control group
    (b) a simple random sample
    (c) the treatment
    (d) all of the other alternatives

45. In the situation of Question 44, what is the response?

    (a) listening to classical music or not
    (b) Group 1 of rats
    (c) * the time taken to run through the maze
    (d) the maze

46. In the situation of Question 44, what role does the classical music play?

    (a) * it is the treatment
    (b) it might be statistically significant
    (c) it is the response
    (d) it is the treatment group

47. A survey is taken on a healthcare issue, where opinion is likely to be different between young and old people. A simple random sample is taken of young people and a separate simple random sample is taken of older people, and the responses to the survey question are combined. It is desired to make a confidence interval for the proportion of all people who agree with the statement made in the survey. Is it possible to use the methods of this course to construct the confidence interval?

    (a) Yes, because random samples were taken.
    (b) No, because a systematic sample is used here, and our methods only apply to simple random samples.
    (c) * No, because this is a stratified sample, and our methods only apply to simple random samples.
    (d) Yes, because the samples don't have to be random for our methods to be used.
    (e) No, because simple random samples were used here, and our methods apply to some other kind of sampling.

48. A researcher believes that acupuncture is helpful for relieving pain. Acupuncture is the process of inserting needles into certain points on the body to stimulate the flow of energy; there is theory saying that particular points on the body are useful for treating particular types of pain.

    The researcher collected a random sample of subjects who suffered from neck pain, and who had never had acupuncture before. Each subject was told that acupuncture is supposed to work by stimulating certain parts of the body that might be quite distant from the part being treated.

    The subjects were divided at random into 2 groups. The subjects in group 1 were given acupuncture using the points considered appropriate for neck pain, while the subjects in group 2 had the needles inserted into random points in their bodies.

    Over the next week, the subjects in both groups were asked to rate their neck pain. It was found that the subjects in group 1 rated their neck pain to be less than the subjects in group 2, and the difference was statistically significant. How do you react to this study?

(a) There should have been a control group of people who received no treatment at all.

(b) This observational study suggests that acupuncture is associated with relief of lower neck pain, but does not offer proof.

(c) * This experiment provides evidence that acupuncture carried out according to the theory is effective in treating neck pain.

(d) This study provides anecdotal evidence only, and so offers no proof of anything.

(e) It was obvious to the subjects whether they were in group 1 or group 2, and so we would expect the subjects in group 1 to report less neck pain.

49. In a statistics course with a large number of students, the course grade is determined by a midterm test and a final exam. The midterm test and the final exam contribute 40% and 60%, respectively to the course mark. E.g. if a student has scored 80 on the midterm test and 70 on the final, that student's course mark is $80(0.40) + 70(0.60) = 74$. A course mark of 80 or above qualifies for an A grade. The scores on the midterm test are normally distributed with mean 80 and standard deviation 6, and the scores on the final exam are normally distributed with mean 60 and standard deviation 15. Assume that the scores on the midterm and the final exam are independent. What percent of the students in this course will receive A grades? Which of the following numbers is the closest to this percentage?

(a) 5%

(b) 20%

(c) 15%

(d) * 10%

(e) 25%

50. A 95% confidence interval for a population mean is from 101 to 104. What can we conclude from this?

(a) The population mean is between 101 and 104.

(b) 95% of the values in the population are between 101 and 104.

(c) 95% of all possible samples from this population will have a sample mean between 101 and 104

(d) * For 95% of all possible samples from this population, the confidence interval calculation will produce an interval containing the population mean, so, based on this sample, we believe the population mean is between 101 and 104

51. From all internet users, a simple random sample of 500 users was taken. 301 of these users had completed university. What is a 95% confidence interval for the proportion of all internet users that have completed university, to the accuracy shown?

(a) * 0.602 ± 0.11

(b) 0.602 ± 0.09

(c) 0.602 ± 0.21

(d) none of the other alternatives

(e) 0.602 ± 0.05

52. The National Halothane Study was a study of the safety of anesthetics used in surgery. Records of many surgeries were examined, the anesthetic used was noted, along with whether the patient survived. Death rates for the four different anesthetics used were as follows:

Anesthetic	A	B	C	D
Death rate	1.2%	1.5%	3.2%	1.7%

What can we conclude?

(a) This is an observational study, so we can conclude that anesthetic C causes a higher death rate.

(b) This is a statistical experiment, so we can conclude that anesthetic C causes a higher death rate.

(c) This is anecdotal evidence, so we cannot conclude anything.

(d) * Anesthetic C might have been used on the most critical cases, so it is impossible to say whether the anesthetic itself caused the higher death rate.