

Math 1040 – Final Review – Chapters 1-10

Chapters 1-3

- Classify as quantitative or qualitative data, and identify the level of measurement:
 - data that are colors of automobiles on a used car lot.
 - data that are the years in which the automobiles were built.
 - data that are evaluations of a drive-through service as good, average, or poor.
 - data that are the number of registered automobiles in each county.
- 31 freshmen, 26 sophomores, 18 juniors and 21 seniors are randomly selected from 620 freshmen, 523 sophomores, 365 juniors and 431 seniors at a certain high school.
 - Identify which sampling technique is used.
 - List all other sampling techniques.
- The following data is to be organized in a frequency distribution with 5 classes: 11, 13, 13, 16, 19, 20, 24, 35, 42, 58, 68, 75, 89.
 - What class interval would you suggest?
 - What lower limit would you choose for the first class?
 - Organize the data into a frequency distribution.
 - Describe the shape of the distribution.
 - Determine the relative frequencies.
 - Draw a histogram.
 - Draw a stem-and-leaf display.
- Assume that last month you spent \$223 on food, \$158 on rent, \$45 on private tutors, and \$64 on everything else.
 - Which graphical displays would be appropriate for this.
 - Make one of these displays.
- The cholesterol levels of a random sample of 11 adults are: 154, 165, 172, 185, 190, 198, 200, 205, 215, 220, 255.
 - Find the five-number summary and draw a box-plot.
 - Find the interquartile range.
 - Find the range.

6. The cholesterol levels of a random sample of 11 adults are: 154, 165, 172, 185, 190, 198, 200, 205, 215, 220, 255. Find the
 - (a) mean
 - (b) median
 - (c) standard deviation.

7. Assume there are 3 test scores in the nineties, 5 in the eighties, 4 in the seventies, 2 in the sixties, and 1 in the fifties. Estimate the
 - (a) mean
 - (b) standard deviation

8. The heights of adult women have a mean of 63.5 inches and a standard deviation of 2.5 inches.
 - (a) Find the z -score for a height of 5ft 5in.
 - (b) Use the empirical rule to find the percentage of women who are between 61.0 and 66.0 inches tall.
 - (c) What does Chebishev's Theorem tell you about the fraction of women who are within two standard deviations of the mean?

9. Assume a shipment of 8 parts contains 3 defective parts. You pick 2 parts at random.
 - (a) Find the probability of selecting two good parts.
 - (b) Find the probability of selecting at least one defective part.

10. Assume that 35% of vehicles on the road are trucks, 18% of vehicles are red, and 4% of vehicles are red trucks. Find the fraction of vehicles that are
 - (a) either red or trucks.
 - (b) neither red nor trucks.

11. You roll a die 3 times. What is the probability that you get
 - (a) no six.
 - (b) at least one six.

12. An IRS auditor must choose 4 small companies out of a group of 12 small companies to be audited. In how many ways can the auditor choose.

13. Fifteen cyclists enter a race. In how many ways can they finish first, second, and third?

Chapters 4-6

14. Assume that daily high temperatures in a city during the month of June are normally distributed with a mean of 92 degrees and a standard deviation of 5 degrees Fahrenheit. What is the probability that it will be under 100 degrees Fahrenheit on the next 12th day of June?

15. Assume that blood pressure readings are normally distributed with mean 135 and standard deviation 8. A researcher wishes to select people for a study but wants to exclude the top 10 percent and the bottom 10 percent. What would be the upper and lower readings to qualify people to participate in the study?

16. Assume that heights of women are normally distributed with a mean of 65 inches and a standard deviation of 3 inches. If 36 women are randomly selected, find the probability that they have a mean height between 64 and 65 inches.

17. A random sample of 12 parking meters in a beach community showed the following incomes (in US\$) for a week. Assume the incomes are normally distributed.
16 45 18 63 26 52 67 42 80 50 64 34
 - (a) Find a 90% confidence interval for the mean weekly income for all parking meters in this beach community.
 - (b) Interpret the result.

18. In a random survey of 240 golfers, 20% said they were left-handed.
 - (a) Find a 99% confidence interval for the proportion of all golfers who are left-handed.
 - (b) Interpret the result.

19. A random sample of 146 college students has a mean annual earnings of \$6200 and a standard deviation of \$2400.
 - (a) Construct a 95% confidence interval for the average annual earnings of all college students.
 - (b) Interpret the result.

20. A certain standard test has a mean of 600 points and a standard deviation of 50 points. We want to be 95% certain that the sample mean will be within 20 points of the population mean. Determine the required sample size.
21. The weights of a random sample of 12 cereal boxes have a sample standard deviation of 0.31 ounce. Find a 95% confidence interval for the population standard deviation σ .
22. The probability that an individual is left-handed is 0.10. In a group of 50 individuals, find the
- (a) mean number of left-handed individuals.
 - (b) probability that there are at most 3 left-handed individuals.
 - (c) Use the normal distribution as an approximation if justified.
23. A sales firm receives an average of three calls per hour on its toll-free number. For any given hour, find the probability that it will receive
- (a) exactly two calls.
 - (b) more than two calls.
24. One thousand tickets are sold at \$1 each. One ticket will be randomly selected and the winner will receive a color television valued at \$350.
- (a) Find the probability distribution of the net-value if a person buys one ticket?
 - (b) Find the expected value and the standard deviation of the net-value.
25. You want to determine the proportion of SUU students who prefer dark chocolate over milk chocolate. Determine the required sample size if the margin of error should be no more than 5%.

Chapters 7-9

The data below shows rainfall (in inches) and yield of wheat (bushels per acre) for 7 years in an area of the Midwest. Use the data the following six problems.

| | | | | | | | |
|---------------|----|----|----|----|----|----|----|
| Rainfall, x | 10 | 9 | 13 | 12 | 19 | 10 | 3 |
| Yield, y | 50 | 46 | 59 | 59 | 62 | 39 | 32 |

26. Calculate the correlation coefficient. What relationship, if any, between x and y does the coefficient suggest.
27. Calculate the coefficient of determination. Interpret in the context of variation.
28. Test the claim that there no significant linear correlation. Use $\alpha = 0.05$. Interpret the result in the context of the data.
29. Find the equation of the regression line and use it to give an estimate for the yield during a year with 15 inches of rainfall.
30. Find the standard error of estimate. Interpret the result.
31. Construct a 95% prediction interval for the yield y , for a year with 15 inches of rainfall. Interpret the result.

For each of the following hypothesis tests:

- (a) State the claim, the null, and alternative hypothesis, mathematically.
- (b) Determine the critical values and determine the rejection region.
- (c) Find the standardized test statistic.
- (d) Find the P-value.
- (e) Make a decision to reject or not reject the null hypothesis.
- (f) Interpret the decision in the context of the original claim.

32. A coin is tossed 500 times and 270 heads appear. At $\alpha = 0.10$, test the claim that the coin is fair (i.e. the proportion of heads is 50% overall).

33. Hugger Polls contends that an agent conducts a mean of 53 in-depth home surveys every week. A streamlined survey form has been introduced, and Hugger wants to evaluate its effectiveness. The number of in-depth surveys conducted during a week by a random sample of agents are:

53 57 50 55 58 54 60 52 59 62 60 60 51 59 56

At the 0.05 level of significance, can we conclude that the mean number of interviews conducted by the agents is more than 53 per week?

34. At a local college, 65 female students were randomly selected and it was found that their mean monthly income was \$623 with a standard deviation of \$121. Seventy-five male students were also randomly selected and their mean monthly income was found to be \$665 with a standard deviation of \$168. Test the claim that male students have a higher monthly income than female students. Use $\alpha = 0.01$.

35. A local school district is concerned about the number of school days missed by its teachers due to illness. A random sample of 10 teachers is selected. The number of days absent in one year is listed below. An incentive program is offered in an attempt to decrease the number of days absent. The number of days absent in one year after the incentive program is listed below. Test the claim that the incentive program cuts down on the number of days missed by teachers. Use $\alpha = 0.05$. Assume that the distribution of days missed is normal.

| | | | | | | | | | | |
|---------|---|---|---|---|---|---|---|---|---|----|
| Teacher | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Before | 3 | 8 | 7 | 2 | 9 | 4 | 2 | 0 | 7 | 5 |
| After | 1 | 7 | 7 | 0 | 8 | 2 | 0 | 1 | 5 | 5 |

36. In a survey of 500 doctors that practice specialized medicine, 25% felt that the government should control health care. In a sample of 800 doctors that were general practitioners, 28% felt that the government should control health care. Test the claim that there is a difference in the proportions. Use $\alpha = 0.10$.

Chapter 10

37. A teacher figures that final grades in the statistics department are distributed as: A, 25%; B, 25%; C, 40%; D, 5%; F, 5%. At the end of a semester, there were 25 A's, 34 B's, 63 C's, 13 D's, and 15 F's. Is there sufficient evidence to show that the teacher is wrong? Use $\alpha = 0.05$.
38. A random sample of 21 women had blood pressure levels with a variance of 321. A random sample of 25 men had blood pressure levels with a variance of 638. Test the claim that the variance of blood pressure levels for women is less than the one for men. Use $\alpha = 0.05$.
39. Three different types of fertilizers are used on raspberry plants. The number of raspberries on each randomly selected plant is given below. Test the claim that the type of fertilizer makes a difference in the mean number of raspberries per plant. Use $\alpha = 0.05$.

| Fertilizer 1 | Fertilizer 2 | Fertilizer 3 |
|--------------|--------------|--------------|
| 6 | 9 | 3 |
| 5 | 5 | 3 |
| 4 | 6 | 6 |
| 5 | 8 | 4 |