Intro to Stats

2nd Semester Final Exam Review Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Unit 7: Normal Distributions

**7.1 Learning Target** • **Normal Density Curves**

1. Heights of men are approximately normally distributed with an average of 69 inches and a standard deviation of 1.8 inches.
	1. Sketch this distribution.
	2. What percent of the data is between 67.2 and 70.8 inches?
	3. What percent of data is between 65.4 and 72.6 inches?
	4. 99.7% of data is between what heights?
	5. 50% of men are shorter than what value?

**7.2 Learning Target** • **Standard Normal Calculations**

1. The average score on the ACT is 22 with standard deviation of 4. The data is approximately normally distributed.
	1. Sketch the distribution.
	2. Find the z-score of a score of 24 on the ACT.
	3. Find the z-score of a score of 32. What percentile would a person with a score of 32 have?
	4. Find the z score of a score of 17. What percentile would a person with a score of 17 have?
	5. What test score would be at the 90th percentile?

**7.3 Learning Target** • **Determining Normality**

1. The ages of 24 wives on their wedding day are listed below:

32 50 25 35 28 45 47 30

23 22 25 38 24 22 16 27

36 22 26 23 28 21 24 23

1. Create a normal quantile plot (on your calculator) and sketch this below:



1. According to the graph above, are the ages of females on their wedding day normal? Explain:

Unit 8: Confidence Intervals

* 1. **Learning Target** • **Sampling Distributions**
1. Fill in the table with the proper symbols for each of the following:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Proportion | Mean | Standard Deviation |
| Statistic |  |  |  |
| Parameter |  |  |  |

1. Sketch a histogram representing the given criteria:

Low Variability, Low Bias Low Variability, High Bias

High Variability, Low Bias High Variability, High Bias

**8.2 Learning Target** • **Confidence Intervals with Proportions**

C.I. = p̂ + z\* (St. dev. of statistic)

1. In a random sample of 150 high school students, it was discovered that 125 of them graduated on time. Find the 95% confidence interval for the true proportion of all high school students who graduate. (SHOW ALL STEPS)
2. In a random sample of 400 students, 61 indicated they needed to do make up time before the end of the semester.
	1. What is the equation for margin of error?
	2. Calculate the margin of error for a 90% confidence interval.
	3. Explain the meaning of this margin of error within the context provided.

**8.3 Learning Target** • **Confidence Intervals with Means**

x̅ + z\* (St. dev. of statistic)

1. A survey of school records of 35 randomly selected students indicated that the average number of absences per semester was 5 with a standard deviation of 1 day. Find a 99% confidence interval for the average number of absences for students during a semester. (SHOW ALL STEPS)
2. Consumer Reports is conducting independent tests to determine the distance a certain car will travel on a gallon of gas. A sample of 50 cars is tested and the average was 23 miles with a standard deviation of 2 miles.
	1. Calculate the margin of error for a 96% confidence interval.
	2. Explain the meaning of this margin of error within the context provided.
3. What effect does increasing the confidence level have on the margin of error?

**8.4 Learning Target** • **Predict Sample Size**

1. A wildlife service wishes to estimate the mean number of days of hunting per hunter for all licensed hunters in the state during a given season. Suppose . At the 90% confidence level, find the sample size needed to have a margin of error within 2 days.

Unit 9: Significance Testing

**9.1 Learning Target** **• Significance Tests with Proportions**

z =

1. According to a recent claim 85% of college bound seniors receive some sort of scholarship. In a random sample of 250 high school students, it was discovered that 220 were awarded a scholarship. Is this significant evidence to prove that more than 85% of high school students get scholarships? Test at α = 0.03. (SHOW ALL STEPS)

**9.3 Learning Target** **• Errors with Significance Tests**

1. Describe a Type I Error and Type II Error from the previous question (in context).

Type I Error:

Type II Error:

**9.2 Learning Target** • **Significance Tests with Means**

z =

1. A certain college claims that the average SAT math score for incoming freshmen is 580 with a standard deviation of 50. In a sample of 30 incoming freshmen from this college, the average SAT math score was 550. Is this significant evidence to prove that the average SAT math score is less? Test at α = 0.05. (SHOW ALL STEPS)

**9.3 Learning Target** • **Errors with Significance Tests**

1. Describe a Type I Error and Type II Error from the previous question (in context).

Type I Error:

Type II Error:

Unit 10: Chi Square Tests

**10.1 Learning Target** • **Chi Square Test for Goodness of Fit**

1. Incoming freshmen at Central Michigan University living at Towers claim to be equally distributed among four dormitories – Carey, Cobb, Troutman, and Wheeler. The dormitory for a sample of 100 incoming freshmen assigned to living at Towers is recorded. Results are in the table below.

**Dorm Carey Cobb Troutman Wheeler Total**

 **Frequency** 19 27 29 25

 **Expected**

1. Add the expected values in the table above.
2. Do a Chi-Squared goodness of fit test to determine if freshman dorm placement is not equally distributed. (SHOW ALL STEPS)

**10.2 Learning Target** • **Chi Square Test for Two-Way Tables**

1. A psychological study was conducted to determine the effect of child care on infant-mother attachment patterns. In the study, 93 infants were classified as “anxious” or “secure.” The average number of hours per week each infant spent in child care was also recorded. Results are shown in the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Low (0-3 hours)** | **Moderate (4-19 hours)** | **High (20-54 hours)** | **Total** |
| **Secure** | 24 | 35 | 5 |  |
| **Anxious** | 11 | 10 | 8 |  |
| **Total** |  |  |  |  |

* 1. Calculate the marginal totals in the table above.
	2. Calculate the expected counts and place these in ( ) in the table above.
	3. Do a Chi-Squared test to determine if there is sufficient evidence to indicate there is a difference in attachment pattern for infants depending on the amount of time spent in child care. (SHOW ALL STEPS)