

## MTH 111 Mathematics as a Human Pursuit Practice Test 2 (Thurs Oct. 15<sup>th</sup>)

### Unit 6A, 6B

1. In a right skewed distribution, which would be the largest:  
a) mean b) median c) mode (why?)
2. Sketch distributions that are symmetric, bimodal, skewed left, skewed right.
3. Determine the 95% confidence interval for the following study: 70% of women surveyed said they felt women should be allowed to joint Augusta National Golf course. The margin of error for the poll was 4 percentage points.
4. Given the following set of data values:  
10 50 60 62 75 75 75 77 80 85

Calculate mean, median, mode, 25<sup>th</sup> percentile, 75 percentile, max, min, range, standard deviation (population). Is it symmetric, skewed left, or skewed right? Are there any outliers? (Explain) Draw a box plot for representing the five-number summary.

### Unit 6C

5. Using the attached Normal Distribution Table:  
Assume that a set of test scores is distributed according to the normal distribution with a mean of 65 and a standard deviation of 15. What percentage of scores lie  
a) below 50                      b) above 65    c) between 50 and 65
6. The mean SAT math score is about 500. Assuming a standard deviation of 100 points, find the z-score and percentile for a student who scored 520.

### Unit 6D

7. What does it mean for an observed difference to be statistically significant at the 0.01 level?
8. Determine the 95% confidence interval for the following study: 35% of 500 people surveyed said they felt Forest Gump was a true story.
9. In the following formula for determining confidence intervals and margin of error in opinion polls and other proportion estimates, identify what each variable means:

$$E = z_c \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} \quad \text{a) } E \quad \text{b) } z_c \quad \text{c) } \hat{p} \quad \text{d) } n$$

10. Suppose that you take a random sample of 3600 people who planned to be in the next U.S. presidential election and you find that 55% support Hillary Clinton over Rudy Julianos if they were opponents. Find a 95% confidence interval for the actual percentage of people who would support Hillary over Arnold.

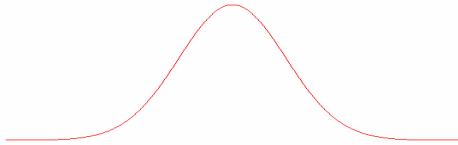
$$11. n \geq \hat{p}(1 - \hat{p}) \left( \frac{z_c}{E} \right)^2 \quad n \geq .25 \left( \frac{z_c}{E} \right)^2$$

Using the appropriate formula above find the minimum size of the sample needed for an opinion poll when we want a 95% confidence interval for each of the following:

- We want a 3% margin of error and there was no previous poll.
- We want a 3% margin of error and we know that the previous opinion poll taken indicated 40% of participants said “Yes” to the poll.

12. A bank teller at Eastern Bank claims that the average amount of money on deposit in a savings account at his bank is 4800 with a standard deviation of 460. A random sample of 36 accounts is taken to test this claim. The average of these accounts is found to be 5000. Using a 5% level of significance, can we reject his claim?

- For the claim being tested, state the null hypothesis  $H_0$  and alternative hypothesis  $H_a$ .
- Specify the level of significance,  $\alpha$ .
- Determine the type of test, critical value  $z_0$  and rejection regions. Label and shade on graph



- Find the standardized z score for your sample mean. and its corresponding percentile value.
- Determine whether to reject or fail to reject the null hypothesis.
- Interpret your decision in context of original claim.

### MTH 111 Mathematics as a Human Pursuit Practice Test 2 Partial Answer Key

1. a) mean                      2. See book                      3. Answer: 66% to 74%

4. Mean: 64.9; Median: 75; mode: 75; 25<sup>th</sup> percentile: 60 ; 75<sup>th</sup> percentile 77.  
Population standard deviation : 20.9  
Max: 85, Min: 10, Range: 75; Skewed Left. Outlier: 10.

5. a) below 50: 15.87%                      b) above 65: 50%                      c) between 50 and 65:  
34.13%

6. z-score: 0.2; Percentile: 57.93%

7. See book    8. 35% +/- 4.18%    9. See book or handout

10. 55% +/- 1.6%    11. a) 1068 b) 1025

12.

- $H_0$ : Ave. deposit = \$4800.     $H_a$ : Ave. Deposit is not equal to \$4800.
- $\alpha = .05$     c) Two tailed,  $z_0 = 1.96$  (and -1.96); d) 2.6 ; 99.53%
- Reject null hypothesis.    f) The average of the savings accounts is believed to be significantly different that 4800 (actually higher).