	V
Stat	145

Chapter 6	
The Standard Normal Distribution	
TOPIC	SLIDE
What is the Standard Normal Distribution?	2
What do z-scores tell us?	3
The Empirical Rule	10
Steps for finding the area under the Normal Curve	13
Tutorial: Using Excel 2007 to obtain z-scores	
Tutorial: Using Excel 2007 to obtain the cumulative area under the Normal Curve	

## Chapter 6 The Standard Normal Distribution



#### WHAT IS THE STANDARD NORMAL DISTRIBUTION?

- A distribution of scores called standard normal or zscores
- Standard normal or z-scores are used when the researcher wants to convert the original unit of measurement into a common unit of measurement (i.e., z-scores)
  - EXAMPLE: Suppose you are told someone's test score is 278. Can you tell if this is a good or bad score? Why?



#### WHAT DO Z-SCORES TELL US?

**Chapter 6** 

- O Z-scores are in standard deviation units
  - The value of a z-score tells you how many standard deviations that score is from its mean
  - EXAMPLE: Suppose a group of scores have a mean equal to 250 and a SD equal to 28. What score is one SD above the mean? Answer: 278. Therefore, the zscore for an original score of 278 is z = +1.00
  - Remember a z-score tells you how many SDs a score is from its mean





- The z-score for  $65^{\circ}$  is z = -1.00 and
- The z-score for 71" is z = +1.00



- +Positive z-scores are above the mean
- -Negative z-scores are below the mean



- We expect 68% of all scores to fall in the range z = -1.00 to z = +1.00
- 68% of all scores are expected to fall within ±1.00 standard deviation of the mean



- We expect 95% of all scores to fall in the range z = -2.00 to z = +2.00
- 95% of all scores are expected to fall within ±2.00 standard deviations of the mean



- We expect 99.7% of all scores to fall in the range z = -3.00 to z = +3.00
- 99.7% of all scores are expected to fall within ±3.00 standard deviations of the mean

**Chapter 6** 



#### AREA UNDER THE STANDARD NORMAL CURVE:

- We can also use z-scores to estimate the percentage of scores expected to occur in a given range
- Provide the end of the end of
  - 68% of all scores are expected to be in the range
    -1.00 to +1.00
  - 95% of all scores are expected to be in the range
    -2.00 to +2.00
  - 99.7% of all scores are expected to be in the range -3.00 to +3.00





 What percentage of scores are expected to be less than or equal to z = 0?

## Chapter 6 The Standard Normal Distribution



### STEPS FOR FINDING THE AREA UNDER THE NORMAL CURVE:

- Sketch the normal distribution
- Plot the approximate location of the z-score(s) in question
- Shade-in the area in question
- Output: Use the Empirical Rule or Excel to obtain the estimated percentage of scores at or below the z-score(s)
- Over the second of the seco





 What percentage of scores are expected to be in the range of z = -2.00 to z = +1.00?



 What percentage of scores are expected to be in the range of z = -2.00 to z = +1.00?



 What percentage of scores are expected to be in the range of z = -3.00 to z = -1.00?



 What percentage of scores are expected to be greater than or equal to z = +1.00?



 Using the height data, what percentage of the sample is expected to be in the range of 59" to 65"?



 Using the height data, what percentage of the sample is expected to be in the range of 59" to 65"?



• Using the height data, what percentage of the sample is expected to be 62" or taller?



• Using the height data, what percentage of the sample is expected to be 62" or taller?



# End of Chapter 6 – Part 1