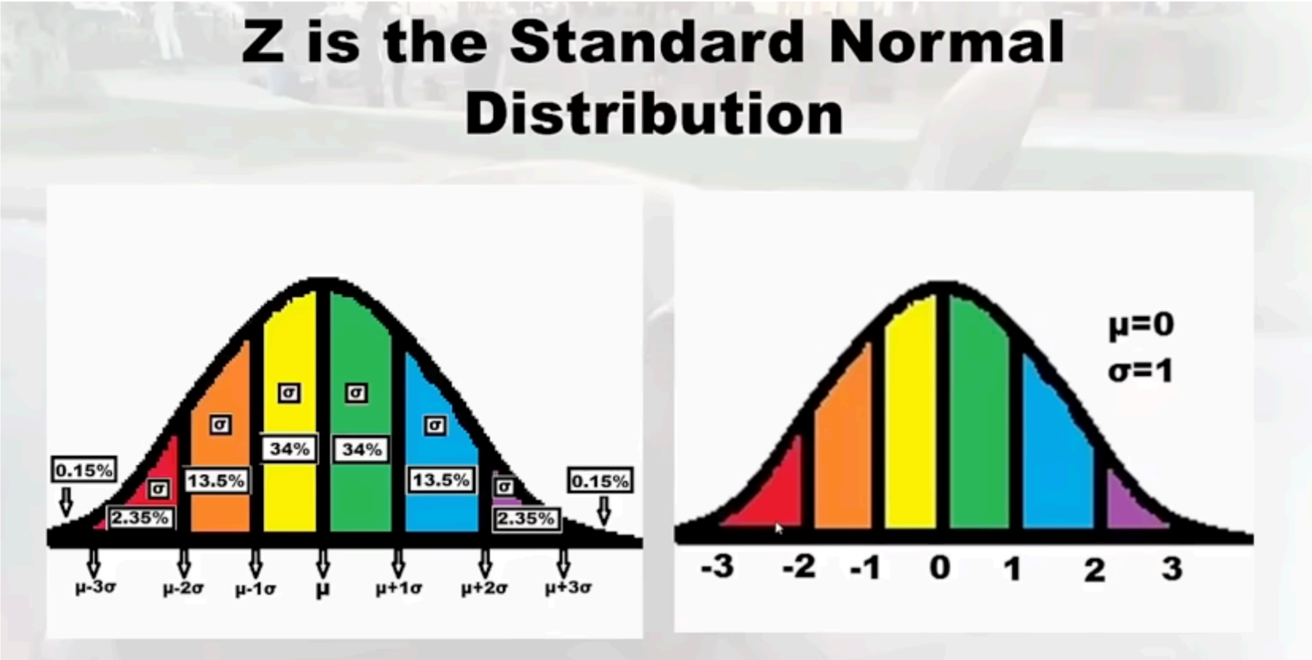
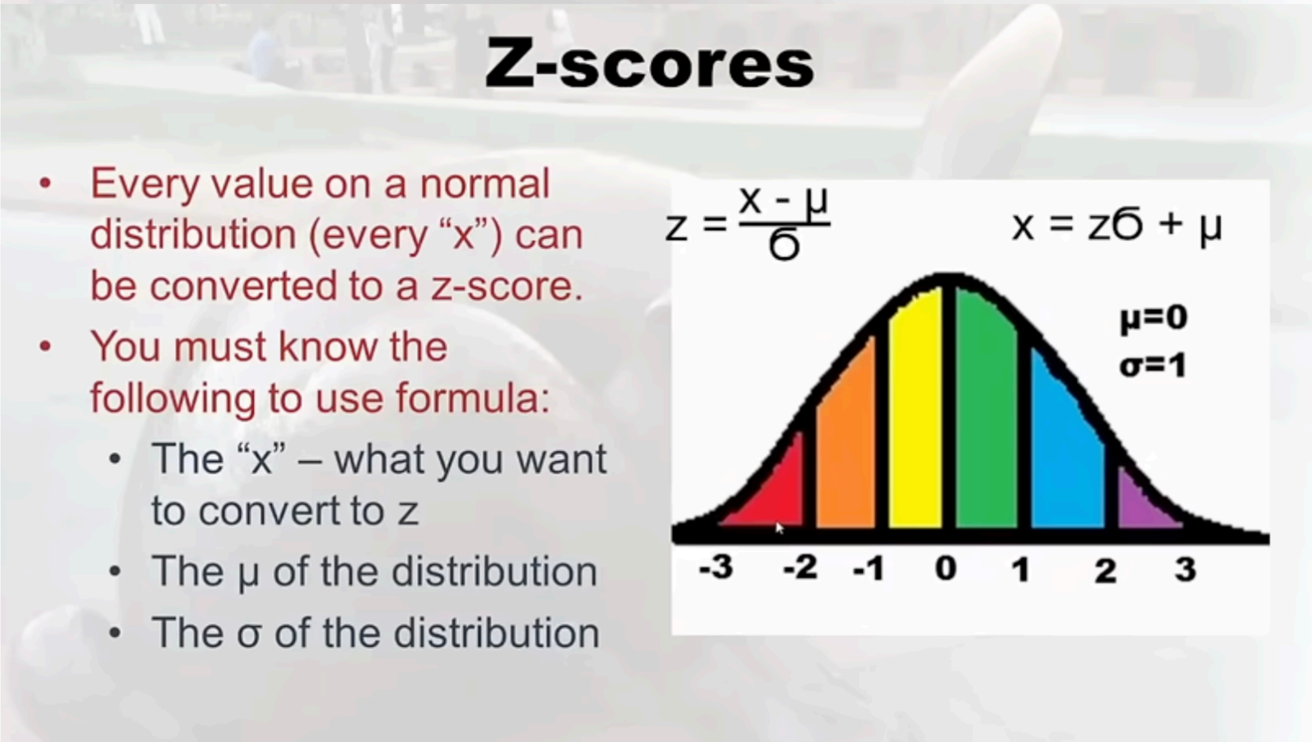
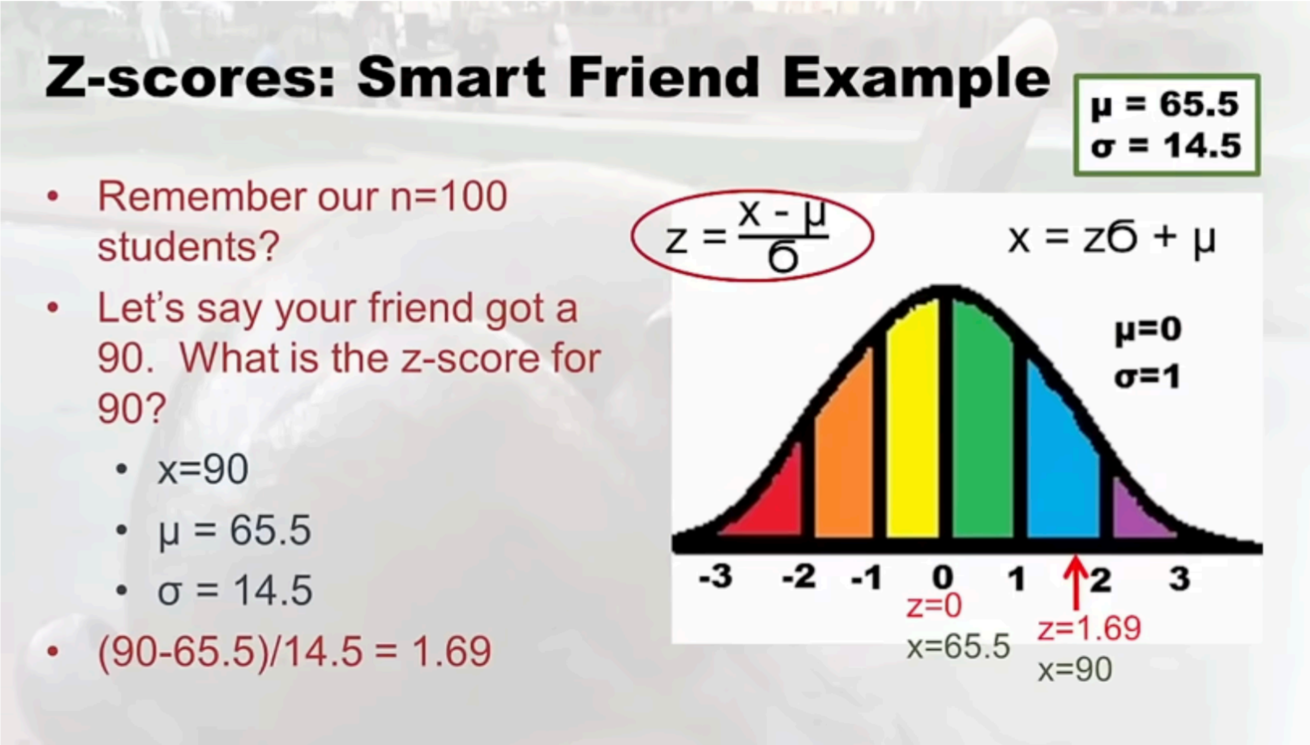
7.2 & 7.3 Z-score and Probabilities

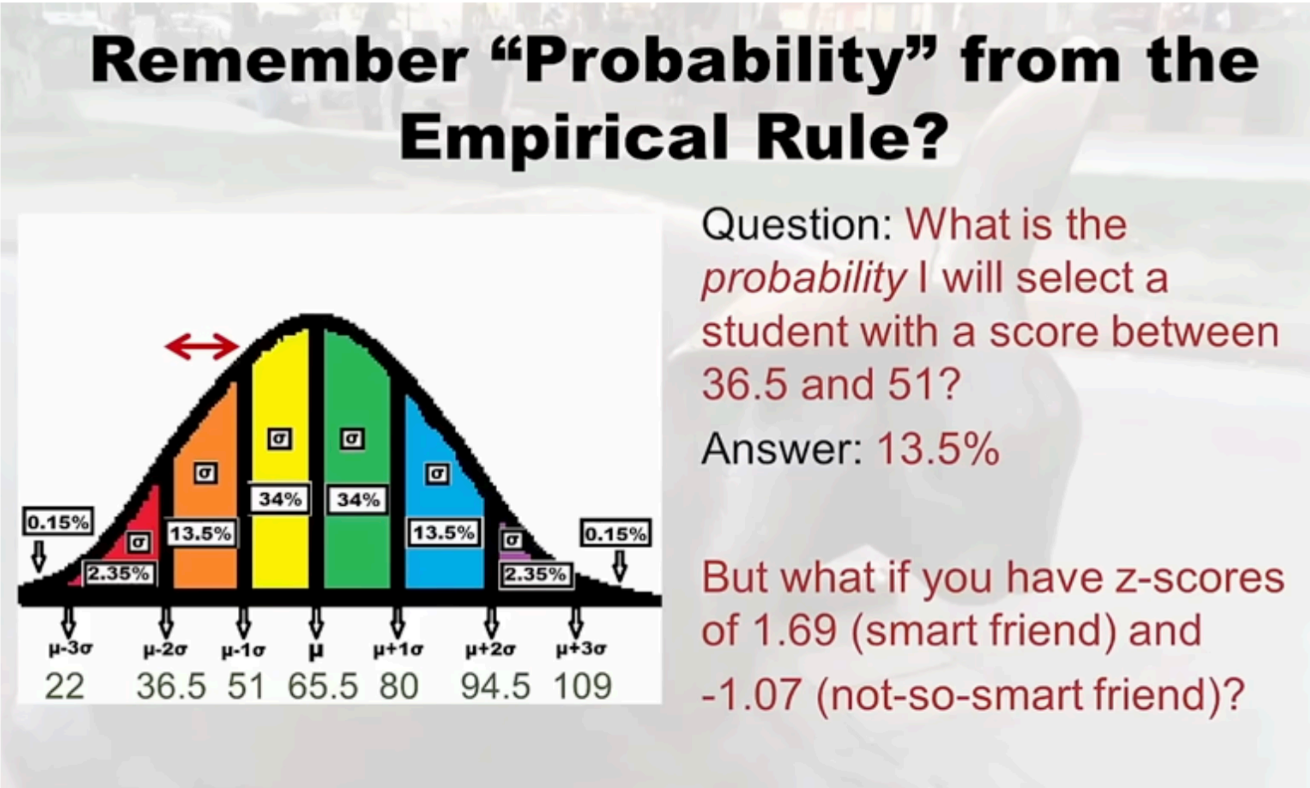
Z-score is the Standard Normal Distribution

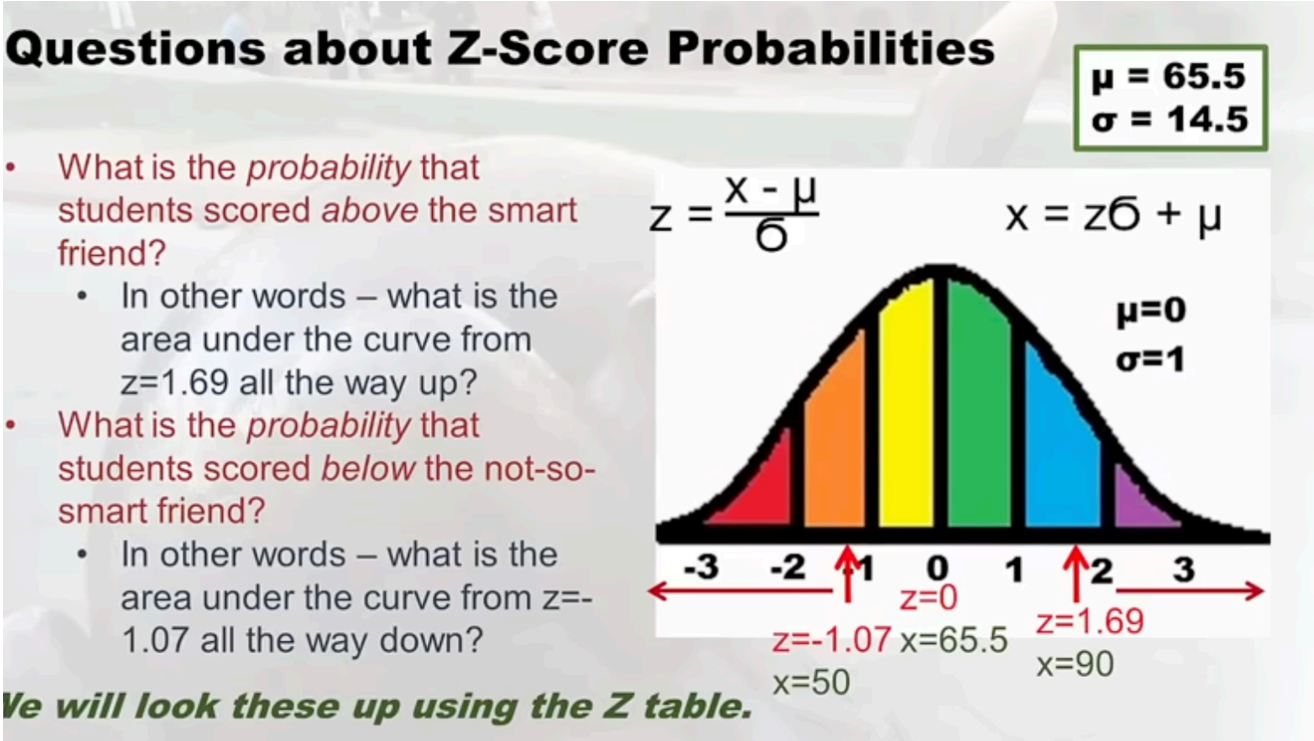




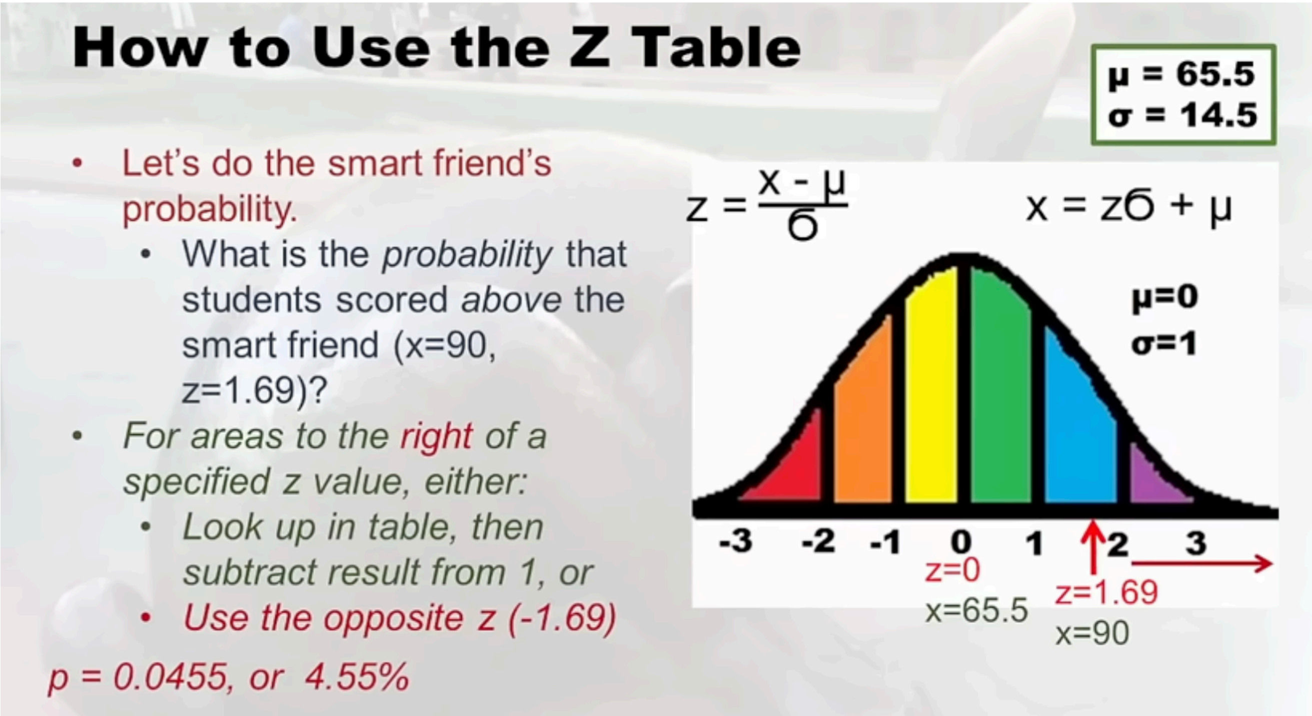


Z-score probability





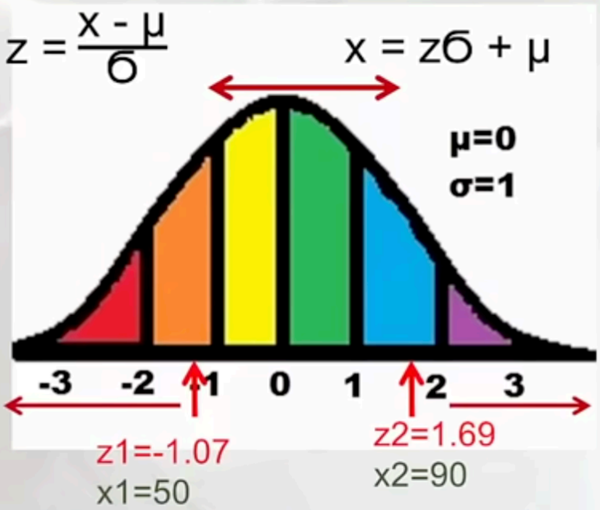
If you are looking for areas to the right, it is more efficient to use the opposite z value



Calculating Probability Between Scores

$\mu = 65.5$
$\sigma = 14.5$

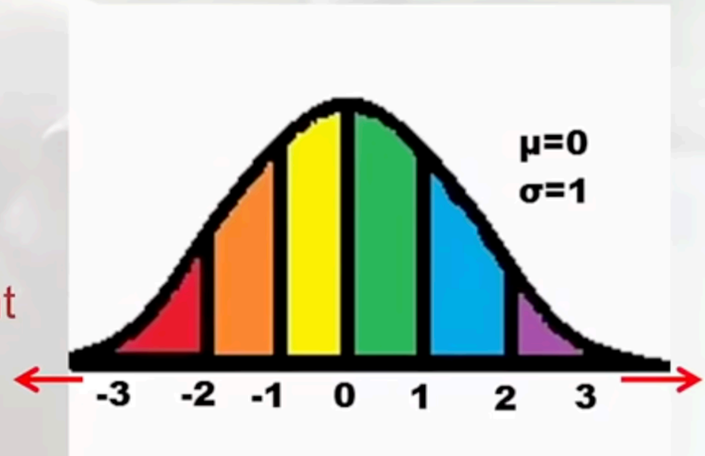
1. Note that you have x1 and x2 (two x's)
2. Calculate z1 and z2
3. For z1, find the probability to the *left (below)* z
   - Remember, direct probability from z table
4. For z2, find the probability to the *right (above)* z
   - Use one of the 2 methods
5. Subtract both z1 and z2 probabilities from 1.



1 – z1 probability – z2 probability = between probability

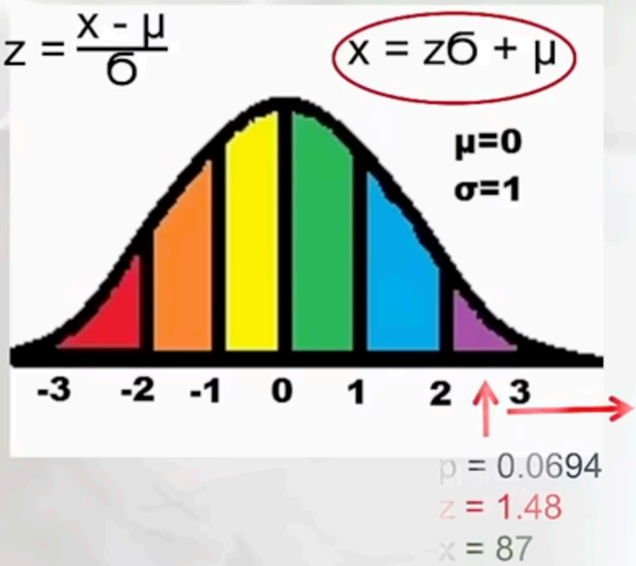
Note About Z Table

1. Treat all areas (probabilities) to the left of z = -3.49 as p = 0.0000
2. Treat all areas (probabilities) to the right of z = 3.49 as p = 1.000



Calculating x Questions

- What is the score that marks the top 7% of the scores?
- We are looking for the z at p=0.0700
  - Closest p in table is 0.0694
  - That maps to z = -1.48
- Since we want "top 7%" we want positive z: z = 1.48
- x = (1.48 * 14.5) + 65.5 = 87
- 87 is the score that marks the top 7% of scores



Calculating x Questions

- What scores mark the middle 20% of the data?
- Strategy is to find the z-score for (1-0.2000)/2 = 0.4000
- For p = 0.4013, z = -0.25
- Also, z = 0.25 is on the positive side.
- x for the left side:
  - x = (-0.25*14.5) + 65.5 = 61.9
- x for the right side:
  - x = (0.25*14.5) + 65.5 = 69.1
- 61.9 and 69.1 mark the middle 20% of the data.