Graduate Statistics

z-scores (Standard Scores)

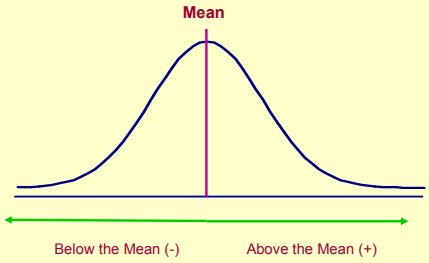
What We Will Cover in This Section

- What a standard score is.
- Computation.
- Properties.
- Assumptions.

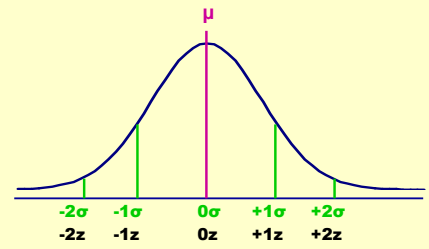
Standard Score (z-score)

The purpose of the STANDARD SCORE is to describe the location of every score in a distribution relative to the mean.

Concept



Units of Measurement



Equations

Defining Equation

$$z = \frac{x - \mu}{\sigma}$$

Working Equation

$$z = \frac{x - \overline{X}}{S}$$

Examples

Mean = 50 SD = 10

What is the z score for a raw score of 65?

$Z = (65 - 50)/10$

$Z = 15/10$

$Z = 1.5$

What is the z score for a raw score of 45?

$Z = (45 - 50)/10$

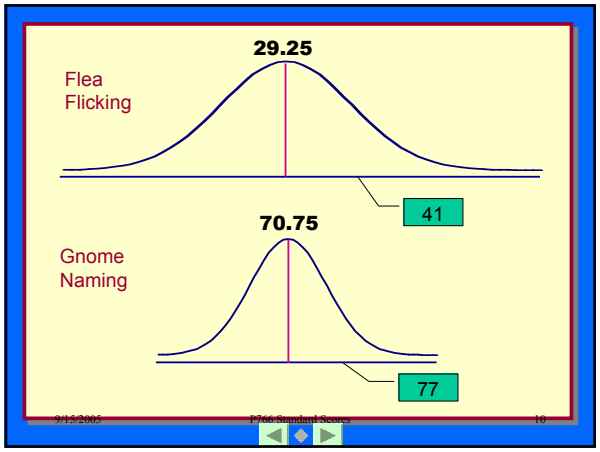
$Z = -5/10$

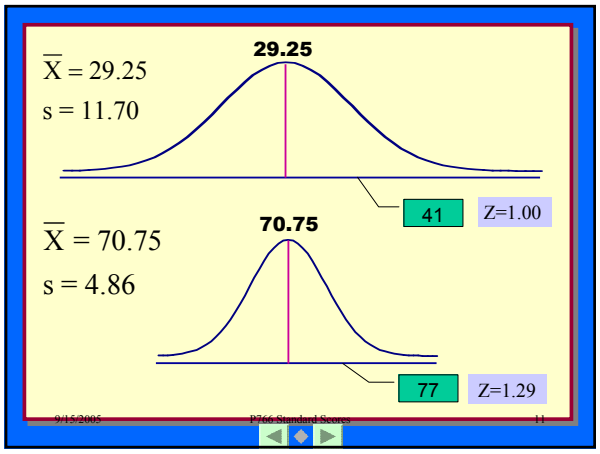
$Z = -.5$

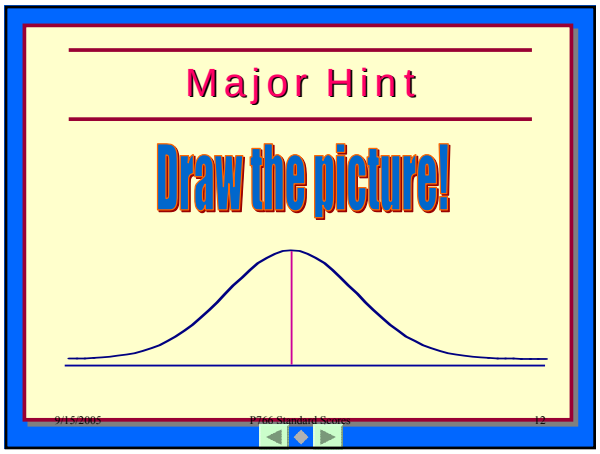
Practice

- A test has a mean of 60 and a standard deviation of 7. Compute the z-scores for the following grades.
  - 74
  - 53
  - 65
  - 40

Name	Flea-flicking test	Gnome-naming test
Kim	33	72
Jan	18	66
Fran	22	68
Pat	**41**	**77**
Mean	29.25	70.75
SD	11.70	4.86


29.25
Flea
Flicking
41
70.75
Gnome
Naming
77
9/15/2005
P766 Standard Scores
10


29.25
$\overline{X}$ = 29.25
s = 11.70
41
Z=1.00
70.75
$\overline{X}$ = 70.75
s = 4.86
77
Z=1.29
9/15/2005
P766 Standard Scores
11


Major Hint
Draw the picture!
9/15/2005
P766 Standard Scores
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z-score to Raw Score

$$\text{Raw Score} = (\text{z-score} \times S_X) + \overline{X}$$

Examples

Mean = 35 SD = 4

What is the raw score for a z-score of 1.5?	What is the raw score for a z-score of -.62?
Raw = (1.5 x 4)+ 35	Raw = (-.62 x 4) + 35
Raw = 6 + 35	Raw = -2.48 + 35
Raw = 41	Raw = 32.52

Z Score to New Raw Score (Standardized Scores)

$$X_{New} = (Z_{Old} \; x \, SD_{New}) + \overline{X}_{New}$$

Mean = 100 SD = 16

What is the IQ score for a z-score of 1.5?	What is the IQ score for a z-score of -1?
IQ = (1.5 x 16) + 100	IQ = (-1 x 16) + 100
IQ = 24 + 100	IQ = -16 + 100
IQ = 124	IQ = 84

Properties of z-Score

1. The mean of the z distribution is 0.
2. The standard deviation of the z distribution is 1.00.
3. The z-score always indicates how far a score is from the mean. The units of measurement are standard deviation units.
4. The shape of the z-distribution will be the same as the parent distribution.

Assumptions

1. The distribution is normal.
2. The units of measurement are interval or ratio scales.

Uses of the z-score

- Comparing different people on the same test.
- Comparing same person across different measures.
- Comparing different people across different tests.


THE END