
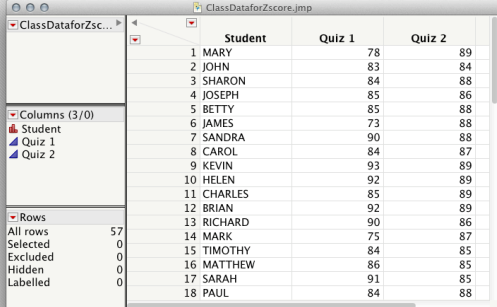


Describing the Location of Scores in Distributions

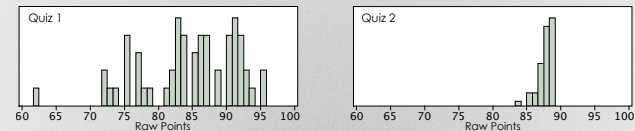
Quiz Scores 

Scores on Quiz 1 and Quiz 2 for 57 Students

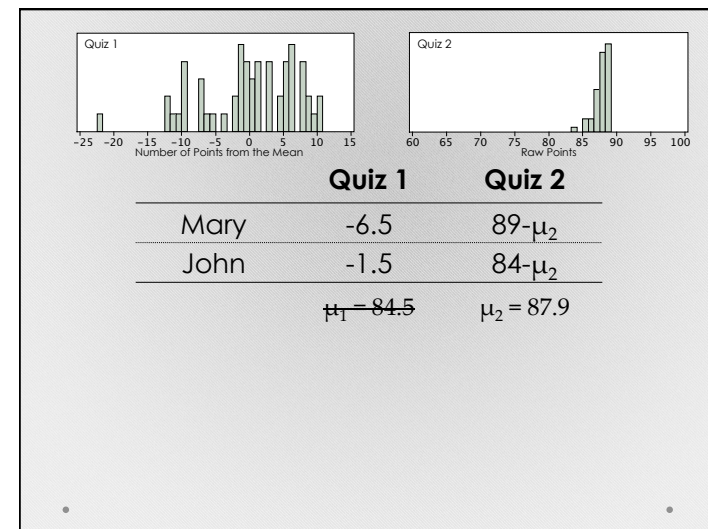
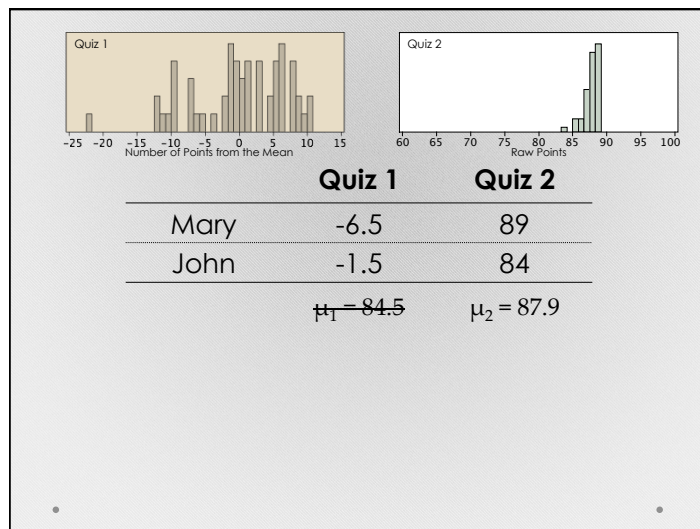
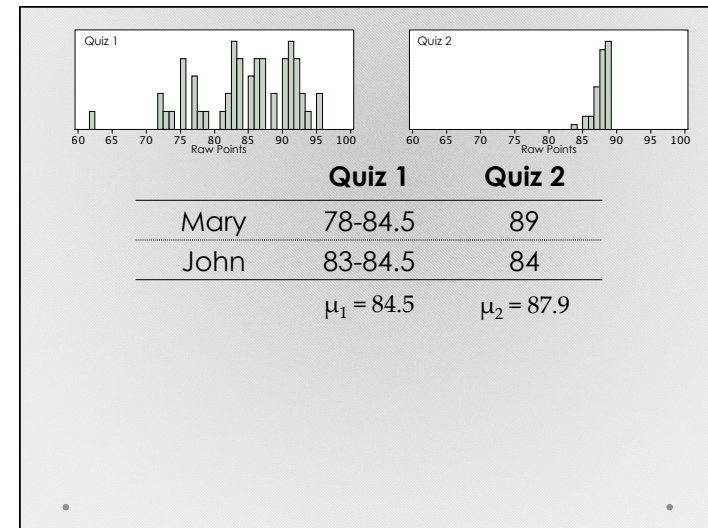
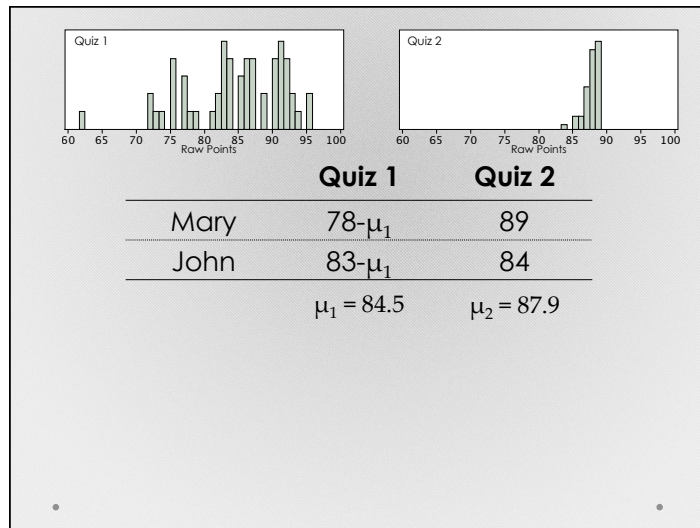


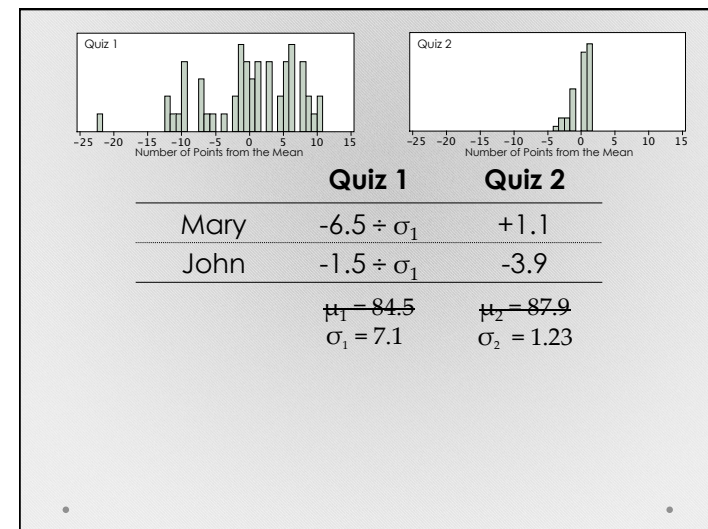
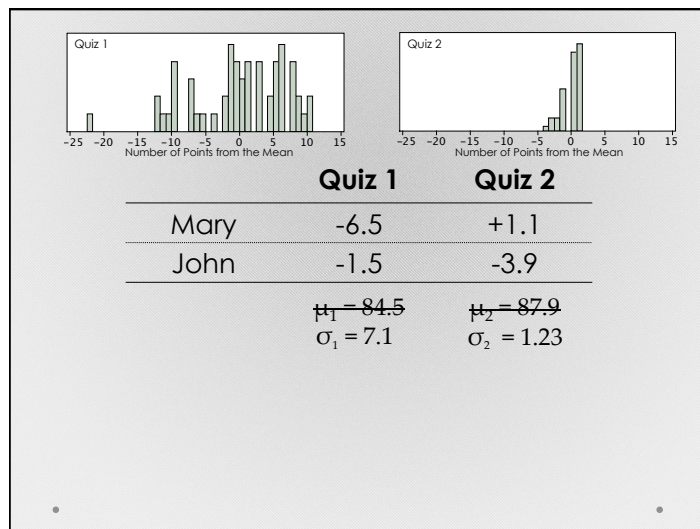
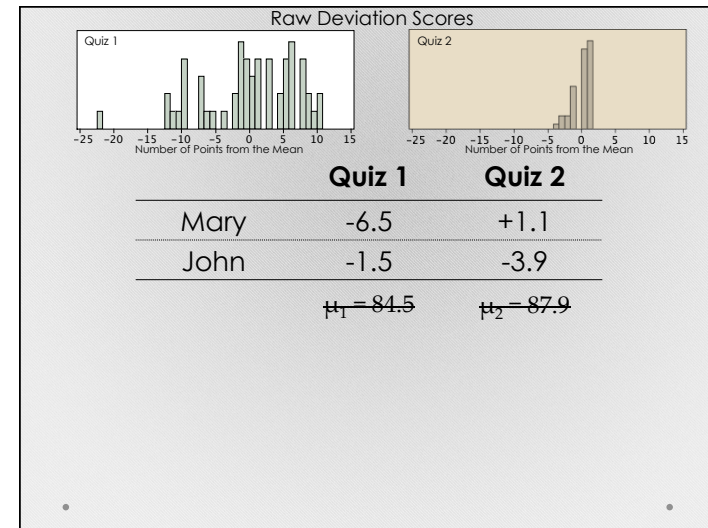
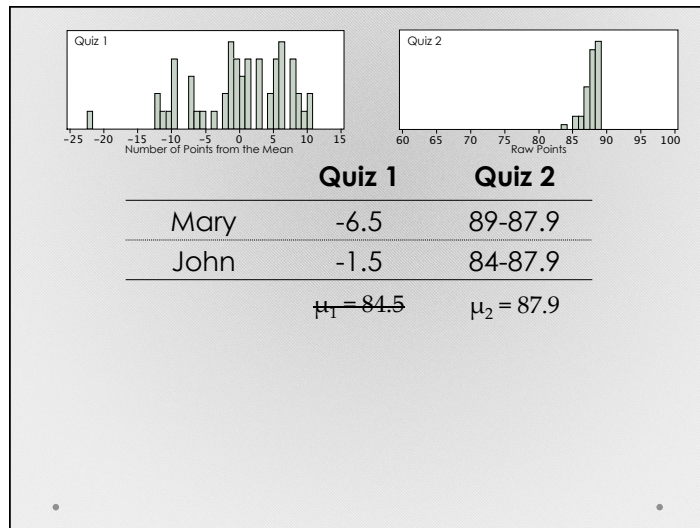
Student	Quiz 1	Quiz 2
1 MARY	78	89
2 JOHN	83	84
3 SHARON	84	88
4 JOSEPH	85	86
5 BETTY	85	88
6 JAMES	73	88
7 SANDRA	90	88
8 CAROL	84	87
9 KEVIN	93	89
10 HELEN	92	89
11 CHARLES	85	89
12 BRIAN	92	89
13 RICHARD	90	86
14 MARK	75	87
15 TIMOTHY	84	85
16 MATTHEW	86	85
17 SARAH	91	85
18 PAUL	84	88

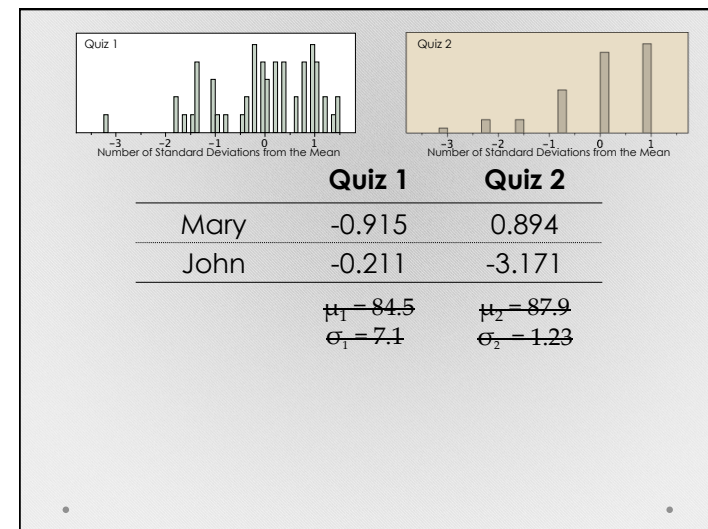
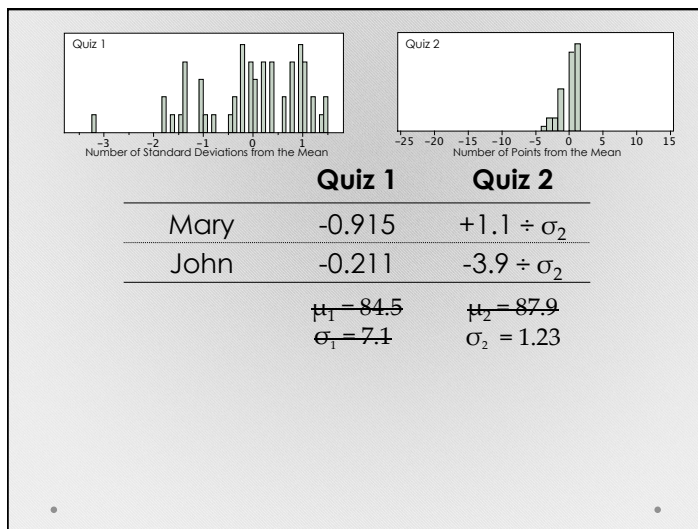
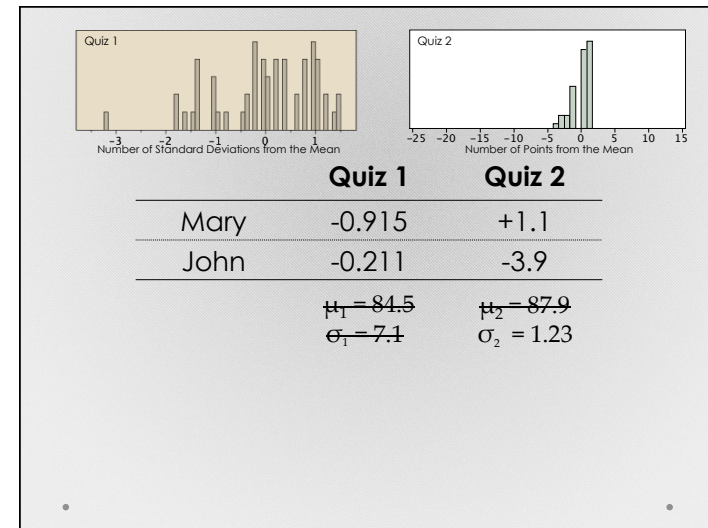
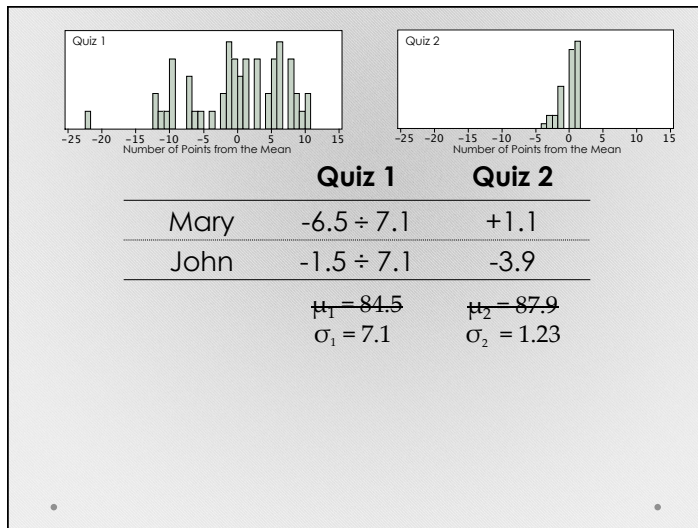
	Quiz 1	Quiz 2
Mary	78	89
John	83	84

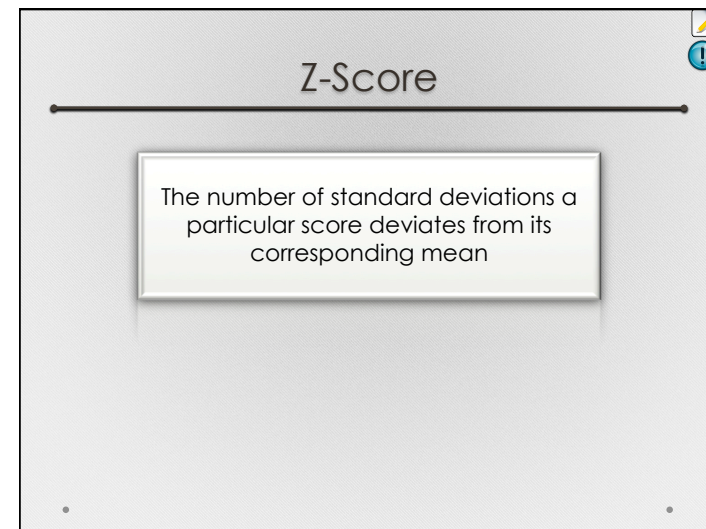
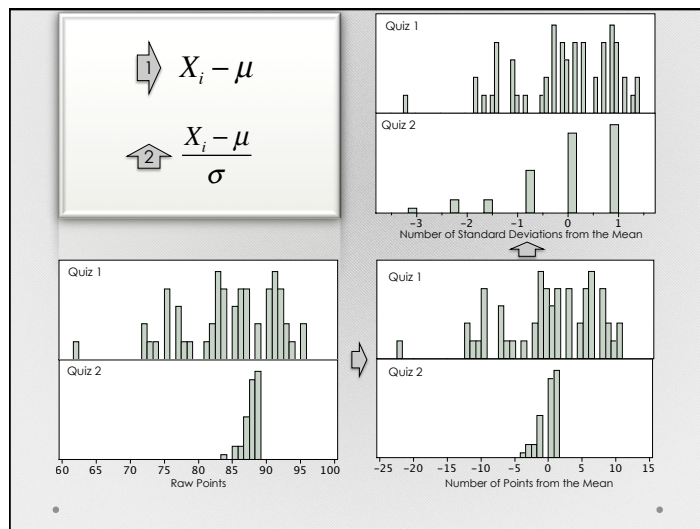
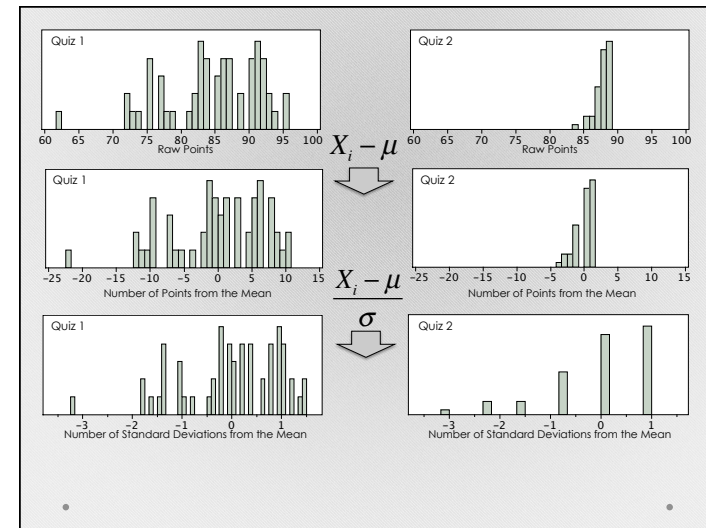
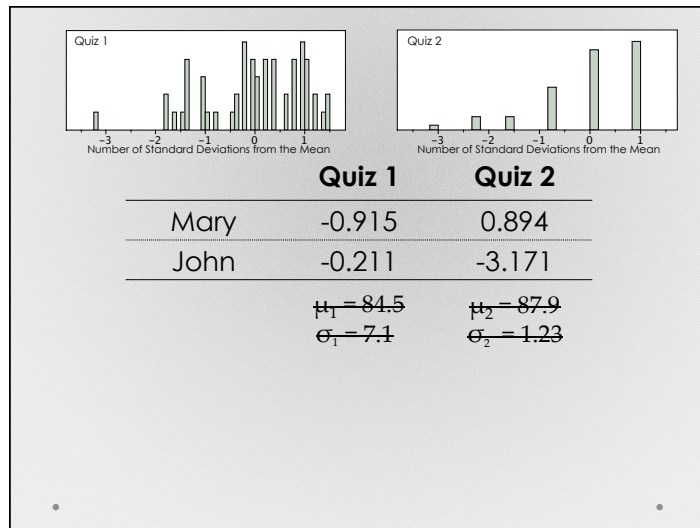


	Quiz 1	Quiz 2
Mary	78	89
John	83	84
	$\mu_1 = 84.5$	$\mu_2 = 87.9$









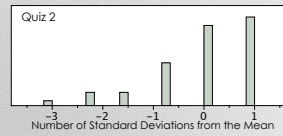
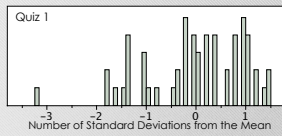
Z-Score

$$z_i = \frac{\text{deviation}_i}{\sigma}$$

Z-Score

$$z_i = \frac{X_i - \mu}{\sigma}$$

- Sign: whether score is above or below mean of the population
- Value: number of standard deviations the score is from the mean



Quiz 1

Quiz 2

Mary	-0.915	0.894
John	-0.211	-3.171

$$\mu_1 = 84.5$$

$$\mu_2 = 87.9$$

$$\sigma_1 = 7.1$$

$$\sigma_2 = 1.23$$

QuizScores

Scores on Quiz 1 and Quiz 2 for 57 Students

Student	Quiz 1	Quiz 2
1 MARY	78	89
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17 SARAH	91	85
18 PAUL	84	88

Converting between Raw and Z-scores

Raw score to Z-score

$$z_i = \frac{X_i - \mu}{\sigma}$$

Z-Score to Raw Score

$$X_i = \mu + z_i \sigma$$

The use of Z-scores

- Describing scores *in* distributions...
with a single number
- Equating and rescaling entire distributions
 - Mean: Always 0
 - Standard Deviation: Always 1
 - Shape: Same as original distribution
- Making scores from non-equivalent distributions comparable.