

**Some Commonly Used Marks and Corresponding z-Scores from the Normal Distribution**

percentiles	deciles	quartiles	midpoint	z
P0.5				-2.576
P1				-2.326
P2.5				-1.960
P5				-1.645
P10	D1			-1.282
P15				-1.036
P20	D2			-0.842
P25		Q1		-0.674
P30	D3			-0.524
P35				-0.385
P40	D4			-0.253
P45				-0.126
P50	D5	Q2	median	0
P55				+0.126
P60	D6			+0.253
P65				+0.385
P70	D7			+0.524
P75		Q3		+0.674
P80	D8			+0.842
P85				+1.036
P90	D9			+1.282
P95				+1.645
P97.5				+1.960
P99				+2.326
P99.5				+2.576

Definitions.

raw score - the data value as actually recorded from the subject

standard score - a raw score that has been "adjusted" (transformed) for the size of the standard deviation (examples: SAT scores, GRE scores, MCAT scores, any score from a standardized test, T-scores typically reported from personality tests, z-scores)

aside: What is a standardized test?

the z-score is the most commonly used standard score in statistical work (although it is not often reported to the general public because many of the values are negative, and da public don't understand no negative numbers)

calculation:

$$z = \frac{\text{score} - \text{mean}}{\text{std. dev.}}$$

(the distance of the score from the mean in units of standard deviations; a z-score of 1 says the raw score was one standard deviation above the mean, a z-score of -2 says the raw score was two standard deviations below the mean, and a z-score of 0 says the raw score was right at the mean)

In theory, a standard score allows us to compare raw scores from different scales: You got a 78 on a history exam on which the M = 72 and SD = 4, and you got a 60 on a math exam on which the M = 50 and SD = 5. On which test

did you do better (relative to the groups who took the tests)?  
What they don't tell you is how well you did on an absolute scale. If that math exam had 200 pts. on it, a score of 60 is not all that great!

z-Scores allow a score to be located in a distribution, but this only works well if the distribution is "normal." Normal distributions of raw scores typically result when the value of the raw score is determined by a large number of small, independent influences. (This is an important fact!)

T-scores (there is a difference between a T-score and a t-value, so don't confuse them!) are standard scores that have a mean of 50 and standard deviation of 10. To convert raw scores to T-scores, first convert to z, then convert z to T. What T-score would correspond to your raw score on the history exam (above)?

Converting standard scores back to raw scores:  $X = M + zs$

Problems from Chapter 5.

7th ed.: 1, 2, 3, 4, 5, 6, 8, 9, 12, 13, 15, 20, 21, 24

6th ed.: 1, 2, 3, 4, 5, 6, 8, 9, 12, 13, 15, 20, 21, 22, 26