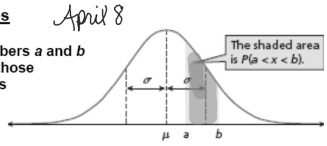
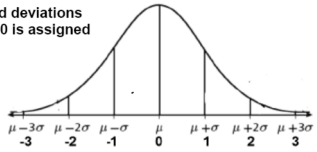
Algebra 2H Notes 8-7: Standard Normal Values April 8

The area under the normal curve between two numbers *a* and *b* corresponds to the probability that *x* lies between those numbers. Because area under the curve represents probability, the total area under the curve is 1.



Finding a Standard Normal Value

A z-score corresponds to the number of standard deviations above or below the mean of the data. Therefore, 0 is assigned to the mean.



If a random variable *x* is normally distributed with mean μ and standard deviation σ, then the standard normal value of *x* is its *z*-score, found by using the formula:

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

The table shows the approximate area under the normal curve for all values less than *z*.

z	−2.5	−2	−1.5	−1	−0.5	0	0.5	1	1.5	2	2.5
Area	0.01	0.02	0.07	0.16	0.31	0.5	0.69	0.84	0.93	0.98	0.99

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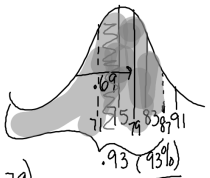
Example

Scores on a test are normally distributed with a mean of 75 and a standard deviation of 8. Estimate each probability.

1. **A randomly selected student scored less than 87.** .93

$$z = \frac{87 - 75}{8} = 1.5$$



2. **A randomly selected student scored more than 79.**

$$z = \frac{79 - 75}{8} = .5 \qquad P(x > 79) = 1 - .69 = .31$$

3. **A randomly selected student scored between 71 and 75.**

$z = 0$ $P(x > 71) = .31$ $.5 - .31$

$$z = \frac{71 - 75}{8} = -.5 \qquad P(x < 75) = .5 \quad (= .19)$$