Z Alpha Over Two ($Z_{\alpha/2}$)

There are four ways to obtain the values needed for $Z_{\alpha/2}$:

   1)   Use the normal distribution table (Table A-2 pp.724-25).

      Example: Find $Z_{\alpha/2}$ for 90% confidence.

      90% written as a decimal is 0.90.

      $1 - 0.90 = 0.10 = \alpha$ and $\alpha/2 = 0.10/2 = 0.05$.

      Look for $0.05 = 0.0500$ or two numbers surrounding it in the body of Table A-2

      (i.e. below the first row and to the right of the first column).

      Since 0.0500 is less than 0.5, we look on page 724.

      The number 0.0500 is not in the table, but it is between 0.0505 and 0.0495, which are in the table.

      Next, check the differences between these last two numbers and 0.0500 to see which number

      is closer to 0.0500. $0.0505 - 0.0500 = 0.0005$ and $0.0500 - 0.0495 = 0.0005$.

      Since the differences are equal, we average the corresponding standard scores.

      Because 0.0505 is to the right of -1.6 and under 0.04, its standard score is -1.64.

      Because 0.0495 is to the right of -1.6 and under 0.05, its standard score is -1.65.

      $(-1.64 + (-1.65))/2 = -1.645$

      Thus $Z_{\alpha/2} = 1.645$ for 90% confidence.

   2)   Use the *t*-Distribution table (Table A-3, p. 726).

      Example: Find $Z_{\alpha/2}$ for 98% confidence.

      98% written as a decimal is 0.98.

      $1 - 0.98 = 0.02 = a$ and $\alpha/2 = 0.01$.

      Find 0.01 in the "**df**" row at the top of page A12.

      $Z_{\alpha/2}$ is the very last entry in the column under 0.01.

      Hence $Z_{\alpha/2} = 2.326$ for 98% confidence.

   3)   Use the TI 83/84 Calculator.

      Example: Find $Z_{\alpha/2}$ for 99% confidence.

      99% written as a decimal is 0.99.

      $1 - 0.99 = 0.01 = \alpha$ and $\alpha/2 = 0.005$.

      Press "2ND" and "VARS" on your TI 83/84 calculator.

Choose "invNorm(" and press "ENTER".

You should see "invNorm(" on your calculator screen.

Type in 0.005, add a right parenthesis and press the "ENTER" key.

The result, rounded to three decimal places, is the opposite of $Z_{\alpha/2}$.

Consequently, $Z_{\alpha/2} = 2.576$ for 99% confidence.

4) Memorize the values of $Z_{\alpha/2}$.

The only confidence levels we use on tests or assignments are 90%, 95%, 98% and 99%,

and the values of $Z_{\alpha/2}$ corresponding to these confidence levels are always the same.

As a result, memorizing the necessary values of $Z_{\alpha/2}$ is fairly easy to do.

Confidence $(1–\alpha)$ g 100%	Significance α	Critical Value $Z_{\alpha/2}$
90%	0.10	1.645
95%	0.05	1.960
98%	0.02	2.326
99%	0.01	2.576

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