

Distributions

Probability Distributions

For the example problem, we will use the five probability distributions shown on the next page. They are used to describe the behavior of a random variable. The visual representation will give you the shape of the variability of the random variables. Distributions take on different shapes, depending on their parameters. In the step-by-step instructions for the example problem, we show you how to produce the distributions using their parameters.

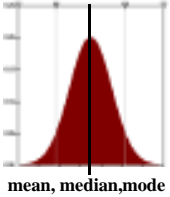
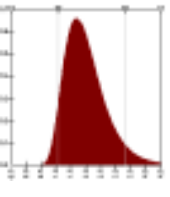
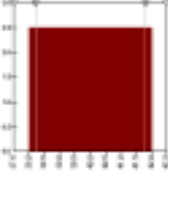
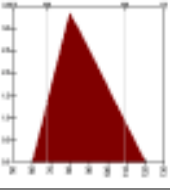
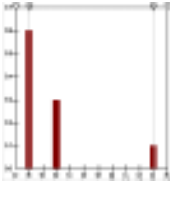
Three Ways to Enter Distributions into Your Spreadsheet

- You can type formulas directly into your spreadsheet. This option requires that you know the exact syntax (arrangement of components) of the formula. We will show you these formulas in the step-by-step instructions.
- You can use @RISK's **Define Distributions** icon. This will give you an opportunity to visually see the shape of the distribution as values for its parameters are entered. We will show you how to use this icon in the step-by-step instructions.
- You can use Excel's function (***fx***) wizard. It shows you a list of distributions you can select.



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Distributions

Distribution	Shape	Parameters	Description
Normal		(mean, standard deviation)	<p>The shape of a normal distribution is a bell curve. It is symmetrical, and the mean, median, and mode are all equal.</p> <p>The mean (μ) and standard deviation (σ) of the random variable being simulated define the shape of the normal distribution. Thus these values are the parameters; you will use them in the normal distribution's formula.</p>
Lognormal		(mean, standard deviation)	<p>A lognormal distribution is skewed to the right. Because it is skewed, its mean, median, and mode will not occur in the center, and they will not be equal.</p> <p>The mean (μ) and standard deviation (σ) of the random variable being simulated define the shape of the lognormal distribution. Thus these values are the parameters; you will use them in the lognormal distribution's formula.</p>
Uniform		(minimum, maximum)	<p>A uniform distribution is shaped like a rectangle. It is used when each value in the range has the same probability of occurring as all other values.</p> <p>The minimum and maximum values of the random variable being simulated define the shape of the uniform distribution. Thus these values are the parameters of the uniform distribution; you will use them in the uniform distribution's formula.</p>
Triangle		(minimum, most likely, maximum)	<p>A triangular distribution is shaped like a triangle.</p> <p>The minimum, most likely, and maximum values of the random variable being simulated define the shape of the triangular distribution. Thus these values are the parameters; you will use them in the triangular distribution's formula.</p>
Discrete		$\{x_1, x_2, x_3\},$ $\{p_1, p_2, p_3\}$ for three outcomes	<p>A discrete distribution illustrates a number of exact outcomes and the probability for each. This example has three outcomes.</p> <p>The parameters are the possible outcome values $\{x_1, x_2, \dots\}$ and their corresponding probabilities $\{p_1, p_2, \dots\}$. The probabilities must add up to one. These are the parameters of the discrete distribution.</p>

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