# Part 2: The Normal Distribution

In Year 12 maths you should have looked at the normal distribution as part of probability, so we will start with this. The Normal distribution is a continuous distribution that follows what we call a 'bell curve' because the 'probability density function' (a fancy word for the equation that draws the graph, pdf for short) looks like a bell. The equation and the graph for the pdf are shown below.

$$f(x, \mu, \sigma) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$
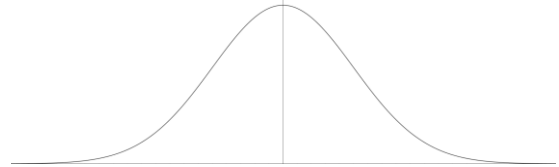
Although this formula looks really nasty, we fortunately we do not need to worry about using it as we can use our graphics calculators (or distribution tables) instead.

This distribution has two parameters that apply to it (parameters are numbers that tell equation about what it is calculating). The first one is the mean of the population and the second is the standard deviation. The mean is the average of all of whatever we are looking at and is represented by the µ symbol, and the standard deviation is a measure of how spread out it is and is represented by the σ symbol.

This also give us a really cool rule called the '68–95–99.7' rule… 68% of the data is within 1 standard deviation of the mean, 95% is within 2 standard deviations, and 99.7% is within 3 standard deviations as shown in the graphic on the right.