Normal Distributions

Normal distributions are the most important distributions. A normal distribution is specified by giving its *mean* μ and its *standard deviation* σ. The normal distribution with mean μ and its standard deviationσ is denoted $N(\mu, \sigma)$. For example, $N(120, 15)$ means the normal distribution with mean $\mu = 120$ and standard deviation $\sigma = 15$.

The special normal distribution $N(0, 1)$ is called the *standard normal distribution*. We'll look at this first.

1. Below is a plot of the standard normal distribution $N(0, 1)$. A rectangle is shown overlaying the plot.

   (a) Compare the area of the rectangle with the area under the graph of the standard normal distribution. Which area is bigger?

   (b) Compute the area of the rectangle.

   (c) Are your results for (a) and (b) consistent with the claim that the area under the graph of the standard normal distribution is exactly 1?
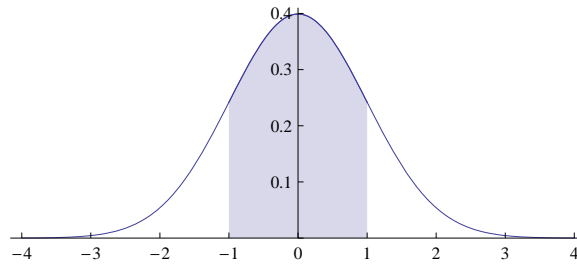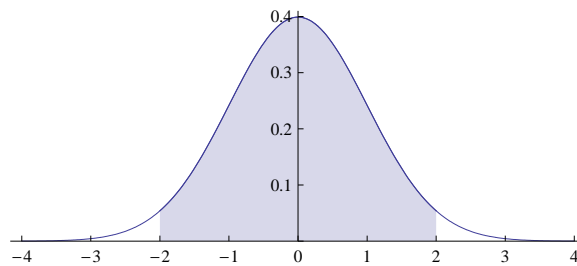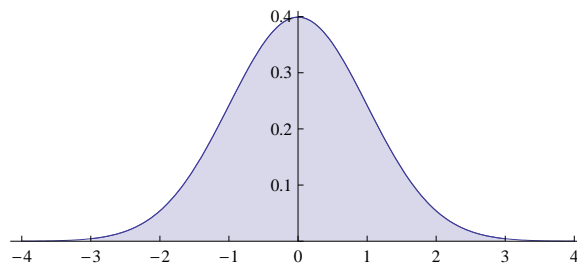
2. Below is a graph of the standard normal distribution $N(0, 1)$. The region under the graph between the values -1 and 1 is shaded.

(a) Estimate the area of this shaded region.

(b) What does this area mean in terms of a proportion of values in this distribution?

3. Below is a graph of the standard normal distribution $N(0, 1)$. The region under the graph between the values -2 and 2 is shaded.
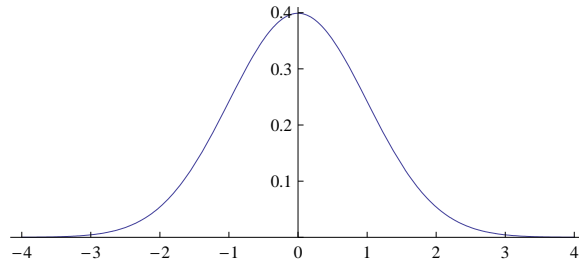

(a) Estimate the area of this shaded region.

(b) What does this area mean in terms of a proportion of values in this distribution?

4. Below is a graph of the standard normal distribution $N(0, 1)$. The region under the graph between the values -3 and 3 is shaded.
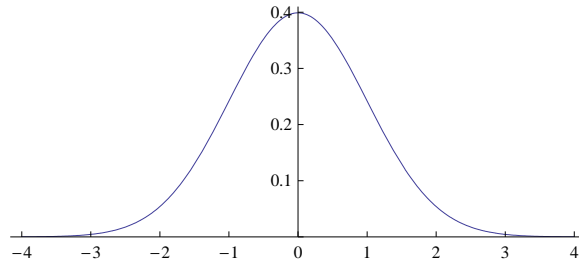

(a) Estimate the area of this shaded region.

(b) What does this area mean in terms of a proportion of values in this distribution?

5. Below is a graph of the standard normal distribution $N(0, 1)$.

   (a) Shade in the region below the graph to the left of the value -1.5.

   (b) Estimate the area of this shaded region.

6. Below is a graph of the standard normal distribution $N(0, 1)$.

   (a) Shade in the region below the graph to the left of the value 2.

   (b) Estimate the area of this shaded region.

7. Below is a graph of the standard normal distribution $N(0, 1)$.
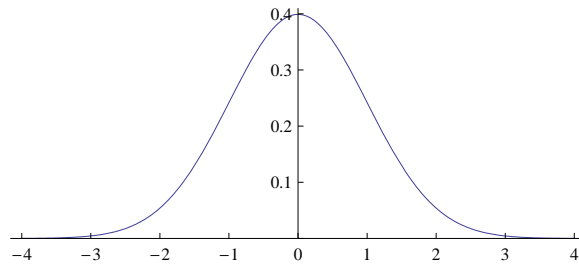
   (a) Shade in the region below the graph between the values -1.5 and 2.

   (b) Estimate the area of this shaded region.