Economics 250
Uniform Density

The uniform density describes a random variable for which all outcomes are equally likely. It can be either discrete or continuous.

Often we focus on the continuous uniform density. It has a finite range, with an upper value of b and a lower value of a. Graphed, the density simply is a rectangle. The height of the rectangle is:

$$f(x) = \frac{1}{b-a}.$$

(See if you can prove that the area is 1.) Remember, though, that the probability of any specific value is zero in the continuous case.

The mean (remember this is labelled μ) is:

$$\mu = \frac{a+b}{2}.$$

(Later on we'll also call this the expected value.) This formula also is easy to prove.

The variance, σ^2, is:

$$var(x) = \sigma^2 = \frac{(b-a)^2}{12}.$$

This formula is a bit harder to prove but is in our formula sheet if needed.

The uniform density sometimes is used to describe waiting times. Suppose a visit to the dentist involves a waiting time that is continuously and uniformly distributed between 3 and 15 minutes. What is the expected waiting time?

To find the probability of a given range, simply measure the length of that range then calculate its ratio to the entire range of possible values. Thus, the probability of waiting more than 12 minutes is 3/12 or 0.25.