CONTINUOUS PROBABILITY DISTRIBUTIONS

We will be concerned with values within an interval.

Pr (TC = 190) vs Pr (180 ≤ TC ≤ 200)

Probability of a specific value = 0.

Def: <u>Probability Density Function</u> of a random variable, *X*, is a function such that the area under the curve corresponding to the function between any two points, *a*, *b*, is equal to the probability that *X* falls between *a* and *b*. Area under the curve for all possible values equals 1 or 100%. This represents the distribution of a continuous Random Variable.

We will be interested in the relative frequency of the occurrence of values between 2 points on the *X*-axis, say *a* and *b*. We want the area in that segment.

Def: **Cumulative Density Function** **for a Random Variable, X, evaluated at a point, a, is the probability that $X \leq a$. It is represented by the area under the Probability Density Function to the left of a.**

Note: Pr ($X \leq a$) and Pr ($X < a$) are the same for a continuous Random Variable. This is not the case for a discrete Random Variable.

Note: Expected value = $E(X) = \mu$ is the average value for the random variable.

Note: Variance = $Var(X) = \sigma^2 = E(X - \mu)^2$

Standard Deviation = $\sqrt{Var(X)} = \sqrt{\sigma^2} = \sigma$

NORMAL DISTRIBUTION (GAUSSIAN DISTRIBUTION)

Probability Density Function

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} e^{-\frac{1}{2\sigma^2}(X-\mu)^2}$$

where $-\infty < x < \infty$

□, □ are two parameters, □ > 0

e = 2.71828

□ = 3.14159

□ determines the location or center of the distribution

□^{2} determines the spread