**Continuous Distributions**

* **Continuous random variable** – takes values in some interval (a, b) ⊆ R
  + A r. v. X is a function from the sample space to the real numbers
  + i.e. X : S → R
  + The range R(X) is continuous
* Individual points are intervals of length 0 – must have 0 probability; i.e.:
  + P(X=a) = 0 ∀ a ∈ R(X)
  + P(a < X < b) = P(a ≤ X ≤ b)
* **Probability density function (PDF)**
  + Assigns a probability to an x ∈ R(X)
  + f(x) ≥ 0 ∀ x ∈ R(X)
  + ∫(-∞ → ∞) f(x)dx = 1 or ∫(x ∈ R(X)) f(x)dx = 1
* If X ~ f(x) and a < b then
  + P(a < X < b) = ∫(a → b) f(x)dx
* **Cumulative distribution function (CDF) for continuous distr.**
  + F(X) = P(X < x) = ∫(-∞ → x) f(x)dx
  + i.e. f(x) = d/dx F(x) – PDF is the derivative of the CDF
  + F(-∞) = 0
  + F(∞) = 1