# 1 Statistic

## 1.1 Subtitle

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Chapter 5: Probability Desities
For continous random variable, the outcome are represented by intervals on the real line.
Interval [—————————-] has infinite number of value
The probability distribution for a continous random variable is represented by the area under a curve $f(x)$ =¿ probability density function
Discrete $P(\bar{X} = x)$ continous when $P(a <= \bar{X} <= b)$ = "Intergration from a to b" f(x)dx
If you try to find $P(\bar{X} = x)$ = "intergration x to x" f(x)dx=0 , then =¿ the probability of a specfic value =0
However we are only looking at intervals $P(a <= \bar{X} <= b) = P(a < \bar{X} < b)$ with at a and b = 0

The probability of a function from value a to b will be the area below the curve of the function from a to b

Cumulative probability functions
$F(x) = P(\bar{X} <= x)$ = "integral from -infinity to x " f(t)dt

Example: Probability density function
$f(x) = e^{-x} when x >= 0 or 0 x < 0$

$P(1 <= \bar{X} <= 5)$ = "integral 5 to 1" $e^x dx = .239$

Example: Probability density function
$f(x) = 0 when x < 0 || 1/2 when 0 < x < 1 || 2 - x when 1 < x < 2 || 0 when x > 2$
$P(.5 <= \bar{X} <= 1.5) = 5/8$
Mean of the Probability density weighted average
M =

$$\int_{big}^{big} x f(x)\, dx.$$

Variance of probability density
$\sigma^2 = \int_{big}^{big} (x - \mu)^2 f(x)\, dx.$

## 1.2 5.2 Normal Distribution

1)area uner curve = 1
2) highes pt at mean
3) Symmetric about $\mu$
4)$mean = median = mode$

5)$Each unique normal distribution can describe by \mu, \sigma$

$f(x, \mu, \sigma) = \frac{1}{2\pi}$