Continuous Probability Distributions

An example

Consider sampling the male student population at UoM, and arranging them in groups or <u>bins</u>.

Suppose we sample 30 males.
the grouped frequency distributions for height are:

A	155	to 160 cm	2
B	160	to 165	4
C	165	to 170	8
D	170	to 175	9
E	175	to 180	5
F	180	to 185	2

we then plot the above

We now scale the vertical axis such that the total area = 1

Also from the graph we will say that for example

the Prob that the height is between 165 to 170 = the area of col C

$= 8/30 = 0.267$

<u>OR</u> area = height × interval = 0.267

height × 5 cm = 0.267

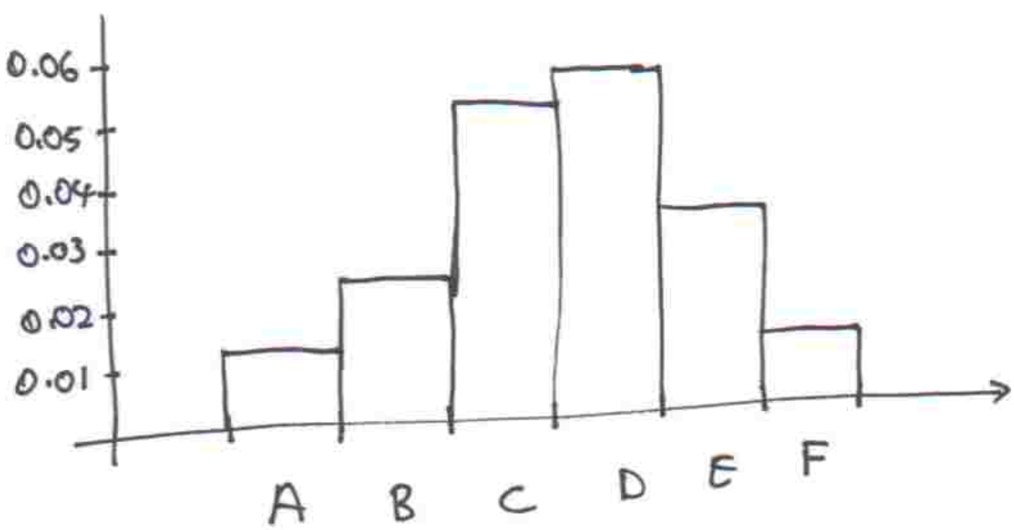
height of col C = $\frac{0.267}{5}$

$= 0.0534$

and all the heights should be worked out as above

col	Prob	Scaled height = Prob/5
A	2/30 = 0.067	0.0134
B	4/30 = 0.133	0.0266
C	8/30 = 0.267	0.0534
D	9/30 = 0.300	0.06
E	5/30 = 0.167	0.0334
F	2/30 = 0.067	0.0134
totals	1.001	0.2002
		×5 = 1.001 !

Plot Again !



total area = 1.0 !

We can now calculate Prob(163 < h < 167)

The Normal Distribution

Most important in Statistics

When a variable is measured for a large number of identical objects. If the variation in the measurements of such a variable are caused by a number of factors that add or substract a small portion to the variable then the tendency is that the variable of ~~normal~~ distributed normal.
e.g height of male population.

Also
When drawing conclusions from sampled data the normal distribution is the most often used.

<u>Shape</u>: symmetrical bell shape

most values concentrated in the middle

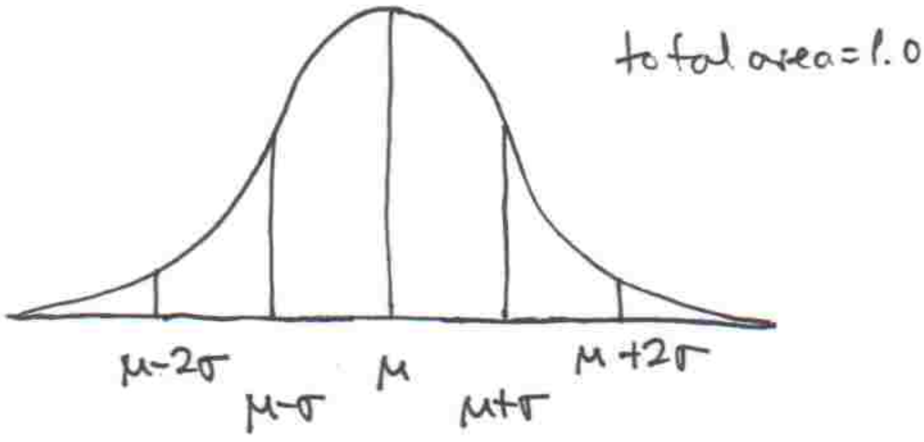
few values at the extreme ends

has only one peak (unimodal)

has two parameters, μ and σ

μ = population mean

σ = standard deviation



1) $\approx$ 68% of area is within $\mu \pm \sigma$

2) $\approx$ 95% of area is within $\mu \pm 2\sigma$

1.96 to be exact

3) $\approx$ 99.7% of area is within $\mu \pm 3\sigma$