Problem (1)

(1) The maximum weight that an elevator is an apartment complex can accomodate is 800 kg. The average adult weight be about 70 kgs with a variance of 200. what is the probability that the lift safely reaches the ground when there are 10 adults in the lift?

→ Given :-

Mean = 70

∴ mean for 10 adults = $70 \times 10 = 700$
(μ)

Variance = 200

variance for 10 adults = $200 \times 10 = 2000$

we know,

standard deviation (σ) = $\sqrt{\text{variance}}$

∴ $\sigma = \sqrt{2000}$

$$\boxed{\sigma = 44.72}$$

here, max. weight that an elevator is an apartment complex can accomodate is given

i.e 800 kg
(x)

It means, If the weight > 800 kg then the elevator unsafely reach the ground. but ~~pro~~, we want probability of lift safely reaching the ground i.e. P(weight of 10 adults < 800 kg)

$$z = \frac{x - \mu}{\sigma}$$

z = standard score

x = observed value

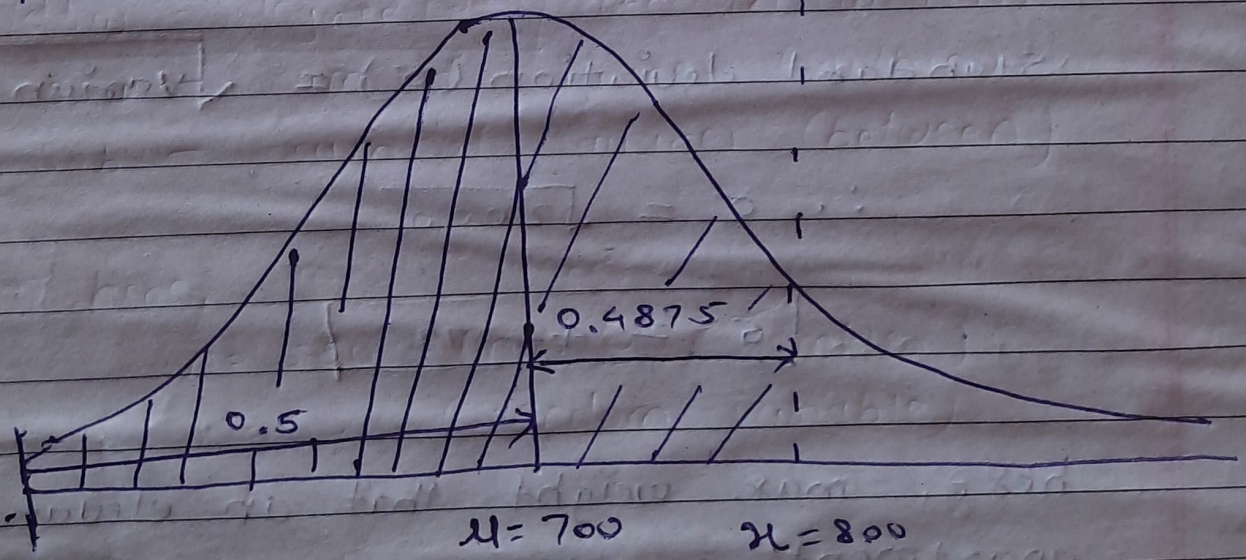
μ = mean

σ = standard deviation

$$z = \frac{800 - 700}{44.72}$$

$$\boxed{z = 2.24}$$

← P(weight of 10 adults < 800)



∴ P(weight of 10 adults < 800) = 0.5 + 0.4875

$= 0.9875$

Probability of (weight of 10 adults < 800)

$$= 98.75\ \%$$

② Problem ②

2> The life of a 60-watt bulb in hours is known to be normally distributed with $\sigma = 25$ hours. create 5 different random samples of 100 bulbs each which has a mean life of $\bar{x}$ bar ~ 1000 hours & perform one way ANOVA with state it

→ Given →

standard deviation = 25

we have to create 5 random samples of 100 bulbs each with mean ≅ 1000 hours

Perform one way anova.

here,

dfb - degree of freedom (between)
dfw - degree of freedom (within)
SSw - sum of squares (within)
SSb - sum of squares (between)

here,

$n = 500$ (no. of samples)
$K = 5$ (random variable)

degree of freedom (dfb) between

$= k - 1$

$= 5 - 1$

$\boxed{dfb = 4}$

degree of freedom within (dfw)

$= n - k$

$= 500 - 5$

$\boxed{dfw = 495}$

As the sample is too large it is very complicated & difficult to calculate & it is very time consuming

so we use excel for calculating SSW & SSB

→ here mean of each sample is

$\bar{x}_1 = 1004$

$\bar{x}_2 = 1003.3$

$\bar{x}_3 = 999.3$

$\bar{x}_4 = 1000.8$

$\bar{x}_5 = 1002.0$

from excel sheet we get,

$$SSW = 292239.29$$

&

$$SSb = 31245.64$$

Next step is finding F-ratio

here,

MSSW – Mean sum of squares (within)
MSSb – Mean sum of squares (between)

$$MSSb = \frac{\text{sum of squares between groups (SSb)}}{\text{degree of freedom}}$$

$$= \frac{31245.64}{4}$$

$$MSSb = 7811.41$$

$$MSSw = \frac{\text{sum of squares within group (SSw)}}{\text{degree of freedom}}$$

$$= \frac{292239.29}{495}$$

$$MSSw = 590.38$$

find

$$F = \frac{MSSb}{MSSw}$$

$$= \frac{7811.41}{590.38}$$

$$\boxed{F = 13.23}$$

Now, find critical value (CV) using F-table,

$$\boxed{f(4, 495) = 2.3719}$$

hence, F value > C.V i.e. 13.23 > 2.3719

hence reject H_0.