DATE: Assignment 1:- DAY:

Male:

mean height:

$$= \frac{6 + 5.92 + 5.58 + 5.92}{4}$$

$$= 5.855$$

Variance height:

$$s^2 = \frac{(6-5.855)^2 + (5.92-5.855)^2 + (5.58-5.855)^2 + (5.92-5.855)^2}{3}$$

$$s^2 = \frac{0.021025 + 0.004225 + 0.0756 + 0.004225}{3}$$

$$s^2 = 0.350$$

mean weight:

$$= \frac{180+190+170+165}{4} = 176.25$$

Variance weight:

$$s^2 = \frac{(180-176.25)^2 + (190-176.25)^2 + (170-176.25)^2 + (165-176.25)^2}{4-1}$$

$$s^2 = \frac{14.0625 + 189.0625 + 39.0625 + 126.5625}{3}$$

$$= 122.75$$

DATE: DAY:

~~Variance~~ mean foot size:

$$\frac{12+11+12+10}{4} = 11.25$$

Variance foot size:

$$s^2 = \frac{(12-11.25)^2+(11-11.25)^2+(12-11.25)^2+(10-11.25)^2}{4-1}$$

$$s^2 = \frac{0.5625+0.0625+0.5625+1.5625}{3}$$

$$s^2 = 0.92$$

P(male) = 0.5

$$P(\cancel{male}\ height \mid male) = \frac{1}{\sqrt{2\pi\sigma_c^2}} e^{-\frac{(v-\mu_c)^2}{2\sigma_c^2}}$$

$$= \frac{1}{\sqrt{2(3.14)(0.350)^2}} e^{-\frac{(8.5-5.855)^2}{2(0.350)^2}}$$

$$= (0.6745)\, e^{-\left[\frac{0.416025}{0.7}\right]}$$

$$= (0.5519)(0.6745) = 0.3723$$

$$P(\cancel{male}\ weight \mid male) = \frac{1}{\sqrt{2\pi\sigma_c}} e^{-\frac{(v-\mu_c)^2}{2\sigma_c^2}}$$

$$= \frac{1}{\sqrt{2(3.14)(122.75)^2}} e^{-\frac{(150-176.25)^2}{2(122.75)}}$$

$$= (0.0360)\, e^{-\left[\frac{689.0625}{245.5}\right]} = 2.1743\times10^{-3}$$

DATE: DAY:

$$P(\text{foot size}|\text{male}) = \frac{1}{\sqrt{2(3.14)(0.92)}} e^{-\frac{(8-11.25)}{2(0.92)}}$$

$$= (0.416)\, e^{-\left[\frac{10.5625}{1.84}\right]}$$

$$= 1.2728 \times 10^{-3}$$

$$\text{Posterior}(\text{male}) = (0.3723)(2.1743 \times 10^{-3})(1.2728 \times 10^{-3})(0.5)$$

$$= 5.1516 \times 10^{-7}$$

$P(\text{female}) = 0.5$

mean height:

$$= \frac{5 + 5.5 + 5.42 + 5.75}{4}$$

$$= 5.4175$$

height variance:

$$s^2 = \frac{(5-5.4175)^2 + (5.5-5.4175)^2 + (5.42-5.4175)^2 + (5.75-5.4175)^2}{(4-1)}$$

$$s^2 = \frac{(0.1743) + (0.00680625) + 0.00000625 + 0.1105}{3}$$

$$s^2 = 0.0972$$

DATE:

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mean weight:

$$\frac{100+150+130+150}{4} = 132.5$$

variance weight:

$$s^2 = \frac{(100-132.5)^2 + (150-132.5)^2 + (130-132.5)^2 + (150-132.5)^2}{(4-1)}$$

$$s^2 = \frac{1056.25 + 306.25 + 6.25 + 306.25}{3}$$

$$s^2 = 558.33$$

mean foot size:

$$\frac{6+8+7+9}{4} = 7.5$$

variance foot size:

$$s^2 = \frac{(6-7.5)^2 + (8-7.5)^2 + (7-7.5)^2 + (9-7.5)^2}{3}$$

$$s^2 = (2.25 + 0.25 + 0.25 + 2.25)/3$$

$$= 5/3 = 1.6667$$

$$P(\text{height}|\text{female}) = \frac{1}{\sqrt{2\pi\sigma_c^2}} e^{-\left(\frac{(v-\mu_c)^2}{2\sigma_c^2}\right)}$$

$$= \frac{1}{\sqrt{2(3.14)(\overset{0.0972}{\cancel{5.4175}})}} e^{-\left[\frac{(6.5-5.4175)^2}{2(5.4175)}\right]}$$

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$$= \frac{1}{\sqrt{2(3.14)(0.0972)}} e^{-\left[\frac{(6.5-5.4175)^2}{2(0.0972)}\right]}$$

$$= (1.2799) e\left[-\left[\frac{1.1718}{0.1944}\right]\right]$$

$$= 2.4108 \times 10^{-3}$$

$$P(\text{weight} \mid \text{female}) = \frac{1}{\sqrt{2(3.14)(558.33)}} e^{-\left[\frac{(150-132.5)^2}{2(558.33)}\right]}$$

$$= (0.0168) e^{-\left[\frac{306.25}{1116.66}\right]}$$

$$= 0.0127$$

$$P(\text{footsize} \mid \text{female}) = \frac{1}{\sqrt{2(3.14)(1.6667)}} e^{-\left[\frac{(8-7.5)^2}{2(1.6667)}\right]}$$

$$= (0.3090) e-\left[\frac{0.25}{3.3334}\right]$$

$$= 0.2866$$

Female Posterior $= (2.4108 \times 10^{-3})(0.0127) \times$
$(0.2866)(0.5)$
$= 4.3874 \times 10^{-6}$

As we have found out that **Female** Posterior is greater than male posterior. Hence given sample is Female.

Gender	mean (height)	variance (height)	mean (weight)	variance (weight)	mean (foot size)	variance (foot size)
Male	5.855	0.350	176.25	122.75	11.25	0.92
Female	5.4175	0.0972	132.5	558.33	7.5	1.6667

Gender	height	weight	foot size
Female	6.5	150	8