QUESTION In a horticultural experiment three varieties of tomato plant are grown. The number n of plants of each variety and the yield x (in kg) of each plant are summarized in the table below

variety	n	$\sum x$	$\sum x^2$
Money − Maker(M)	8	95	1160
Tigerella(T)6	92	1430	
Outdoor Girl(G)	6	76	1000

Assuming that the yields of each variety are normally distributed about means μ_M, μ_T, μ_G respectively with common variance σ^2.

(i) Estimate σ^2.

(ii) Test the hypothesis $\mu_M = \mu_T = \mu_G$.

(iii) Set up a 95% confidence interval for $\mu_M - \mu_T$

ANSWER $n = 20$ $T = 95 + 92 + 76 = 263$ $c = \frac{263^2}{20} = 3458.45$
$\sum x^2 = 1160 + 1430 + 1000 = 3590$ $TSS = 3590 - C = 131.55$
$BSS = \frac{95^2}{8} + 92^2 6 + 76^2 6 - C = 3501.46 - C = 43.01$
$WSS = 131.55 - 43.01 = 88.54$

(i) anova Table

Source	df	ss	ms
Between groups	2	43.01	21.505
Within groups	17	88.54	5.208=$\hat{\sigma}^2(a)$
total	19	131.55	

(ii) $H_0 : \mu_M = \mu_T = \mu_G$ H_1 : Not all equal $\alpha = 5\%$
$F_{2,17} = \frac{21.505}{5.208} = 4.13$ significant at 5%

(iii) $\overline{x}_m = \frac{95}{8} = 11.875$ $\overline{x}_T = 15.33$ $95\% CI$

$$\begin{aligned} -3.46 &\pm t_{17}\sqrt{5.208(\frac{1}{8} + \frac{1}{6})} \\ -3.46 &\pm 2.11 \times 1.2325 \\ -3.46 &\pm 2.60 \end{aligned}$$