6. $SD = 14$

$n = 169$

$\mu = 15$

$\bar{x} = 16$

1.

2. $\alpha = 0.10$ (90%)

3. Calculate the z value.

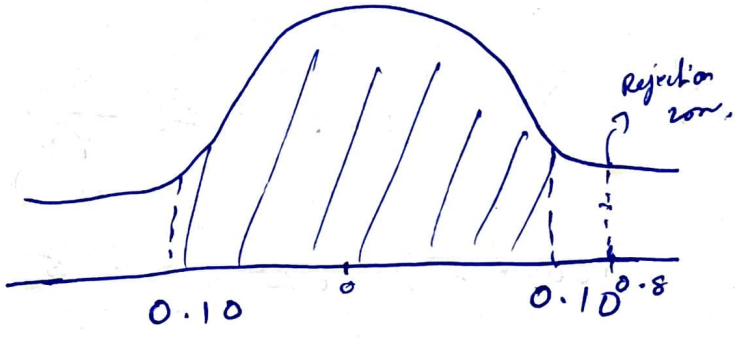
$$z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

$$= \frac{16 - 15}{14 / \sqrt{169}}$$

$$= \frac{1}{14/13}$$

$$= 1 / 1.076$$

$$z = 0.92$$



4. p value (from the z table)

$$p_{(z = 0.92)} = 0.8212$$

$\boxed{\alpha = 0.10}$

$p = 0.8212 > \alpha = 0.10$

$P(z) < 0.10$; Reject the null hypotheses

$p(z) > 0.10$; Accept the H_0 hypothesis

4 Perform t-~~test~~ distribution

Mean $\bar{x} = 100.8$

SD $= 1.85$

$n = 10$

$v = 10 - 1 = 9$

95% level $\alpha = 0.05$ & $\therefore \frac{\alpha}{2} = 0.025$

$t_{9, 0.025} = 2.262$

$$\bar{x} - t_{n-1, \frac{\alpha}{2}} \frac{s}{\sqrt{n}} \leq \mu \leq \bar{x} + t_{n-1, \frac{\alpha}{2}} \frac{s}{\sqrt{n}}$$

$$100.8 - 2.262 * \frac{1.85}{\sqrt{10}} \leq \mu \leq 100.8 + 2.262 * \frac{1.85}{\sqrt{10}}$$

$$100.8 - 2.262 (0.585) \leq \mu \leq 100.8 + 2.262 (0.585)$$

$$100.8 - (1.323) \leq \mu \leq 100.8 + (1.323)$$

$$99.47 \leq \mu \leq 102.123$$

3. Ratio of Sample Vaucines

$S_1 = 0.893$
$S_2 = 0.829$

$$f = \frac{S_1^2}{S_2^2} = \frac{0.797}{0.687}$$

$$= 1.160$$

$H_0 = \sigma_1^2 = \sigma_2^2$

$H_A = \sigma_1^2 \neq \sigma_2^2$

$V_1 = 10 - 1 = 9$

$V_2 = 12 - 1 = 11$

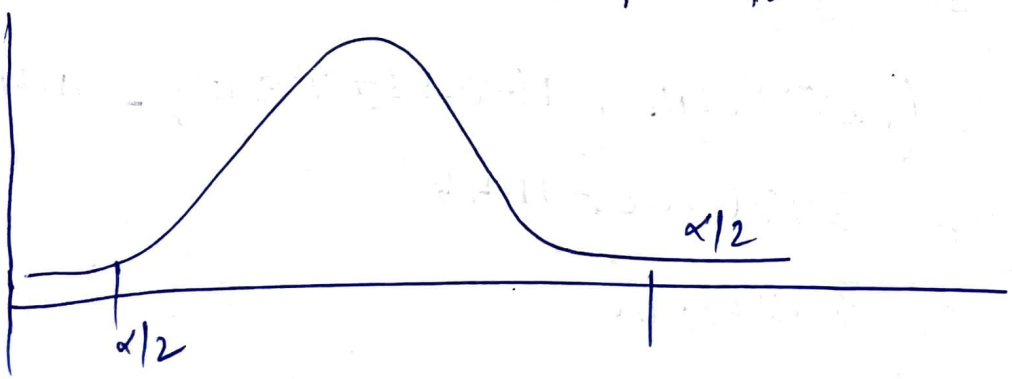
$F_{0.025, 9, 11} = 3.5879$.

$$F_{0.975, 9, 11} = \frac{1}{F_{0.025, 9, 11}} = 0.2787$$

$F_{0.025, 9, 11} = 3.5879$; $F_{0.975, 9, 11} = 0.2787$;

$F_{observed} = 1.160$

Accept H_0



2. ANOVA :

Financial :

	x^2
10.76	115.77
15.05	226.50
17.01	289.34
5.07	25.70
19.5	380.25
8.16	66.58
10.38	107.74
6.75	45.56
92.68	1257.44

Energy

	x^2
12.72	161.79
13.91	193.48
6.43	41.34
11.19	125.21
18.79	353.06
20.73	429.73
9.6	92.16
17.4	302.76
110.67	1699.53

utilities

	x^2
11.88	141.13
5.86	34.33
13.46	181.17
9.9	98.01
3.95	15.60
3.44	11.83
7.11	50.55
15.7	246.49
71.3	779.11

Correction Term :

$$C_x = \frac{\Sigma (x)^2}{N}$$

$$= \frac{(92.68 + 110.67 + 71.3)}{24}$$

$$= 274.65 / 24$$

$$= 11.44$$

(1) Sum of Square total :

$$SST = \Sigma x^2 - C_x$$

$$= (1257.44 + 1699.53 + 779.11) - 11.44$$

$$= 3736.08 - 11.44$$

$$= 3724.68$$

[2] Sum of Squares among group

$$SS_A = \frac{(\Sigma x^2)}{n} - C_x$$

$$= \left(\frac{92.68^2}{8} + \frac{110.67^2}{8} + \frac{71.32^2}{8} \right) - C_x$$

$$= \left(1073.69 + 1530.98 + 635.49 \right) - 11.44$$

$$= (3240.16) - 11.44$$

$$= 3228.72.$$

[3] Sum of Squares within the group.

$$SS_W = SS_T - SS_A$$

$$= 3724.68 - 3228.72$$

$$= 495.96$$

[4] Mean of Sum of Squares among the group.

$$MSS_A = \frac{SS_A}{k-1}$$

$k = 3$

$$= \frac{3228.72}{3-1} = 1614.36.$$

(5) Mean of Sum of Squares within the group.

$$MSSW = \frac{SS_W}{n-k}$$

$$= \frac{495.96}{24-3}$$

$$= \frac{495.96}{21}$$

$$= 23.61$$

F - Ratio :

$$= \frac{MSSA}{MSSW} = \frac{1614.36}{23.61}$$

$$= 68.37$$

Compare F-Ratio (calculate F value)

Source of variance	df	SS	MSS	F Ratio
Among group	k-1 (3-1)	3228	1614	68.37
within group	n-k (24-3) → 21	495	23.61	

df (21, 2) = 3.466

$F_C \Rightarrow 68.37$, $F_t = 3.466$

F ratio > F table

68.37 > 3.466

Reject Ho hypothesis.

Yes, there is a difference in the rate of reduction among the industries

5.

1. $\mu = 105 \rightarrow H_0$

$\mu > 105 \rightarrow H_A$

2. $\bar{x} = 125$

$\mu = 105$

$SD = 14$

$n = 25$

$$t = \frac{\bar{x} - \mu}{s/\sqrt{n}}$$

$$t = \frac{125 - 105}{14/\sqrt{25}}$$

$$= \frac{20}{2.8} = 7.14$$

3. $\alpha = 5\%$

$df = 25 - 1 = 24$

$t_{table} = 1.711$

$t_{table} < t_{observed}$

$1.711 < 7.14$

Reject H_0

Mean sales is greater & enhancement worked.