

① mean = 70 kgs

variance = 200

mean of 10 adults = $10(70) = 700$

variance for 10 adults = $10(200) = 2000$

standard deviation = $\sqrt{\text{variance}}$

$$= \sqrt{2000} \Rightarrow 44.7$$

max weight lift can accomodate is 800

so we need to find the probability
that the people (adults) weight must be
less than 800 kg so it reaches to
ground safely.

$$P(\text{weight} > 800) = \frac{800 - 700}{44.7} \Rightarrow \frac{100}{44.7} = 2.23$$

$$\Rightarrow 100 - 2.23 \Rightarrow 97.7 - 1.$$

Hence, it'll reach ground safely, the probability
is 97.7%.

② $N = 500$ (5×100) $df \rightarrow$ degrees of freedom.

$$df_{\text{total}} = 500 - 1 = 499$$

$$df_{\text{within}} = df_{\text{total}} - df_{\text{between}}$$

$$= 499 - 4 = 495$$

$$\sum_{ij} X_{ij} = 199712; \sum_{ij} X_{ij}^2 = 199691630$$

$$ss_{\text{total}} = \sum_{ij} X_{ij}^2 - \frac{1}{N} (\sum_{ij} X_{ij})^2 = 267464.1$$

$$ss_{\text{within}} = 266084.2$$

$$ss_B = 1379.6$$

$$MS_B = \frac{ss_B}{df_{\text{between}}} = \frac{1379.6}{4} = 344.9$$

$$MS_{\text{within}} = \frac{ss_{\text{within}}}{df_{\text{within}}} = \frac{266084.2}{495} = 537.5$$

$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}} = \frac{344.9}{537.5} = 0.6$$

Null & alternative hypothesis.

$$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5$$

H_1 : Not all means are equal.

The hypothesis testing is done by F-score.
For One Way ANOVA

Based on info provided $\alpha = 0.05$

$df_1 = 4$ $df_2 = 4$, the rejection region

$$R = \{F : F > F_c = 2.39\}$$

Test statistics

$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}} = \frac{344.9}{637.5} = 0.64$$

since $F = 0.64 < 2.39 = F_c$, it concludes
that the null hypothesis is not rejected
using P value approach.

P value is $P = 0.63 > 0.05$ it concludes
that null hypothesis is not rejected.

| | A1 | A2 | A3 |
|-------|-----|-----|-----|
| 86 | 90 | 82 | |
| 79 | 76 | 68 | |
| 81 | 88 | 73 | |
| 70 | 82 | 71 | |
| 84 | 89 | 81 | |
| mean | 80 | 85 | 75 |
| Total | 400 | 425 | 375 |

| groups | count | Sum | Mean | Variance |
|--------|-------|-----|------|----------|
| A1 | 5 | 400 | 80 | 38.5 |
| A2 | 5 | 425 | 85 | 35 |
| A3 | 5 | 375 | 75 | 38.5 |

| ANOVA | | | | | | | | |
|----------------------------|--|-----|----|------------|------------|-----------|------------|--|
| | | SS | df | MS | F | p-vlue | F score | |
| Degrees of freedom within | | 448 | 12 | 37.3333333 | | | | |
| Degrees of Freedom between | | 250 | 2 | 125 | 3.34821429 | 0.0699094 | 3.88529383 | |

$$\textcircled{2} \quad F = \frac{MS_{\text{between}}}{MS_{\text{within}}} = \frac{125}{37.33} \\ = 3.3482$$

P-value = 0.0699

$$H_0: \mu_0 = \mu_1 = \mu_2 = \mu_3$$

H_r: not all means are equal

Let $\alpha = 0.05$

P-value > 0.05

Hypothesis cannot be rejected.