CASE : Weight Loss
By Diet or Exercise ?

- Two groups of men (considered to have similar weight problems) were observed for a period of one year, and their weight loss [in Kg] were recorded.
- GROUP 1 (42 men) went through a diet based weight loss program.
- GROUP 2 (47 men) went through an exercise based weight loss program.

SOURCE : Wood et al. (1988)
The New England Journal of Medicine

Weight Loss Data

Group 1

Sample Size : 42

Average (Mean) Weight Loss : **7.8 [Kg]**

Standard Deviation : **5.8 [Kg]**

Group 2

Sample Size : 47

Average (Mean) Weight Loss : **4.6 [Kg]**

Standard Deviation : **5.5 [Kg]**

SOURCE : Wood et al. (1988)
The New England Journal of Medicine

Two-Sample Z – Test

Known population standard deviations (or large samples)

The null hypothesis is that both population means μ_1 and μ_2 are equal, thus their difference is equal to zero.

H_0: $\mu_1 = \mu_2$

with either a one-sided or a two-sided alternative hypothesis.

H_a: $\mu_1 \neq \mu_2$

(or $\mu_1 > \mu_2$ or $\mu_1 < \mu_2$)

Test Statistic:

$$z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \quad \sim N(0,1) \text{ if } H_0 \text{ is true}$$

$1 - \alpha$ Confidence Interval for $\mu_1 - \mu_2$:

$$\bar{x}_1 - \bar{x}_2 \pm z^* \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

Note: If $n_1 \geq 30$ and $n_2 \geq 30$ then we may use: $\sigma_1 \approx s_1$ and $\sigma_2 \approx s_2$