

### Answer on Question # 41936, Math, Statistics and Probability

Five universities in Malaysia were surveyed. The sample contained 250 information technology students, 80 being women; 160 bioinformatics students, 40 being women. Compute a 90% confidence interval for the difference between the proportions of women in these two programs.

#### Solution

An interval estimate for the difference in proportions  $\widehat{p}_1 - \widehat{p}_2$  with confidence level  $(1 - \alpha)$  is given by

$$\widehat{p}_1 - \widehat{p}_2 \pm z_{\alpha/2} \sqrt{SE_1^2 + SE_2^2},$$

where  $SE_1$  and  $SE_2$  are the standard errors of  $\widehat{p}_1$  and  $\widehat{p}_2$ , respectively.

In our case:

$$\widehat{p}_1 = \frac{80}{250} = 0.32, \widehat{p}_2 = \frac{40}{160} = 0.25.$$

The standard errors of  $\widehat{p}_1$  and  $\widehat{p}_2$  are

$$SE_1 = \sqrt{\frac{0.32(1 - 0.32)}{250}}, SE_2 = \sqrt{\frac{0.25(1 - 0.25)}{160}}.$$

A 90% confidence interval for the difference between the proportions of women in these two programs is

$$0.32 - 0.25 \pm z_{0.05} \sqrt{\frac{0.32(1 - 0.32)}{250} + \frac{0.25(1 - 0.25)}{160}} = 0.07 \pm 1.645 \cdot 0.045 = 0.07 \pm 0.07 \text{ or } (0; 0.14)$$

**Answer: A 90% confidence interval for the difference is (0%; 14%).**