In class exercise

Each member of a random sample of 50 sixth-graders in Kearney kept a record for one week of the amount of time spent watching television. The sample mean and sample variance are 15 hours and 10 hours^2.

A second random sample of 40 second-graders in the Greenhill school district also kept records for one week of the amount of time spent watching television. The sample mean and sample variance are 10 hours and 5 hours^2.

Construct a 95% confidence interval for the mean difference between Kearney 6th graders and Greenhill 2nd graders.

Kearney & Greenhill

Kearney 6th graders
$n_1 = 50, \quad \bar{x}_1 = 15 \ hours$
$s_1^2 = 10 \ hours^2$

Greenhill 2nd graders
$n_2 = 40, \quad \bar{x}_2 = 10 \ hours$
$s_2^2 = 5 \ hours^2$

$z_{.025} = 1.96$

$$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{10}{50} + \frac{5}{40}} = .5701$$

$$(\bar{x}_1 - \bar{x}_2) \pm z_{.025} \cdot s_{\bar{x}_1 - \bar{x}_2} = (15 - 10) \pm 1.96 \cdot .5701$$

$$= 5 \pm 1.117$$

$$P(3.88 \le \mu_1 - \mu_2 \le 6.12) = .95$$

We are 95% confident that Kearney 6th graders on average watch between 3 hour & 53 minutes to 6 hours and 7 minutes more television per week than Greenhill 2nd graders.

In class exercise

A Gallup poll found that 16% of 505 men and 25% of 496 women surveyed favored a law forbidding the sale of all beer, wine, and liquor throughout the nation. Develop a 95% confidence interval for the difference between the proportion of women who favor such a ban and the proportion of men who favor such a ban.

$\bar{p}_1 = .25\ (women) \qquad \bar{p}_2 = .16\ (men)$
$n_1 = 496 \qquad n_2 = 505$

$$(\bar{p}_1 - \bar{p}_2) \pm z_{\alpha/2} \cdot s_{\bar{p}_1 - \bar{p}_2}$$

$$s_{\bar{p}_1 - \bar{p}_2} = \sqrt{\frac{\bar{p}_1(1-\bar{p}_1)}{n_1} + \frac{\bar{p}_2(1-\bar{p}_2)}{n_2}} = \sqrt{\frac{.25 \times .75}{496} + \frac{.16 \times .84}{505}} = .025$$

$$(.25 - .16) \pm 1.96 \times .025 \quad \Rightarrow \quad .09 \pm .05$$

$$\boxed{P(.04 \le p_1 - p_2 \le .14) = .95}$$

We are 95% confident that between 4% and 14% more women favor such a ban than men.