

Problem 2.

We find that for this simple random sample of Saskatchewan tax payers, $n_1 = 120$, $n = 400$, $\theta = 3/4$. Thus, an estimator of p is given by

$$\hat{p} = \frac{n_1/n}{2\theta - 1} - \frac{1 - \theta}{2\theta - 1} = \frac{120/400}{1/2} - \frac{1/4}{1/2} = 0.10.$$

The estimated variance is given by

$$s^2(\hat{p}) = \frac{1}{(2\theta - 1)^2} \cdot \frac{1}{n} \cdot \frac{n_1}{n} \cdot \left(1 - \frac{n_1}{n}\right) = \frac{1}{(1/2)^2} \cdot \frac{1}{400} \cdot \frac{120}{400} \cdot \left(1 - \frac{120}{400}\right) = 0.0021.$$

In other words, an approximate 95% confidence interval for p is given by $0.10 \pm 2(0.046)$ or $(0.0083, 0.1917)$.