第七章

7.4 $\hat{p}_{sy} = \frac{1}{n}\sum y_i = \frac{132}{200} = .66$

$$\hat{V}(\hat{p}_{sy}) = \frac{\hat{p}_{sy}\hat{q}_{sy}}{n-1}\left(\frac{N-n}{N}\right) = \frac{(.66)(.34)}{199}\left(\frac{2000-200}{2000}\right)$$

$$B = 2\sqrt{\hat{V}(\hat{p}_{sy})} = .0637$$

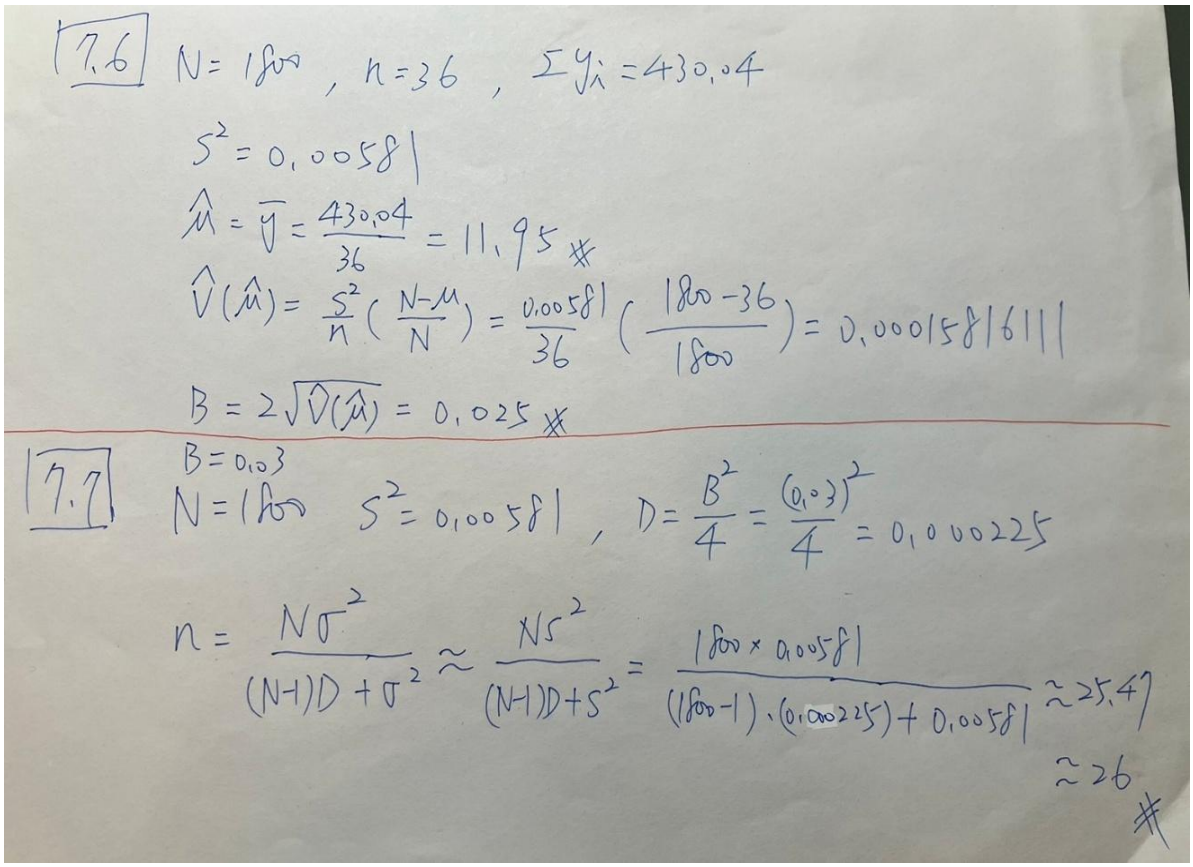
7.5 $N = 2000,\ \hat{p}_{sy} = .66,\ \hat{q}_{sy} = .34,\ D = B^2/4 = (.01)^2/4 = (0.005)^2$

$$n = \frac{Npq}{(N-1)D + pq} \approx \frac{N\hat{p}_{sy}\hat{q}_{sy}}{(N-1)D + \hat{p}_{sy}\hat{q}_{sy}}$$

$$= \frac{2000(.66)(.34)}{1999(.005)^2 + (.66)(.34)} = 1635.72 \approx 1636$$

Note that the sample size nearly equals the population size, so it is not practical to take the sample. One might better measure every employee or, better yet, agree on a larger margin of error for the survey.

7.6-7.7

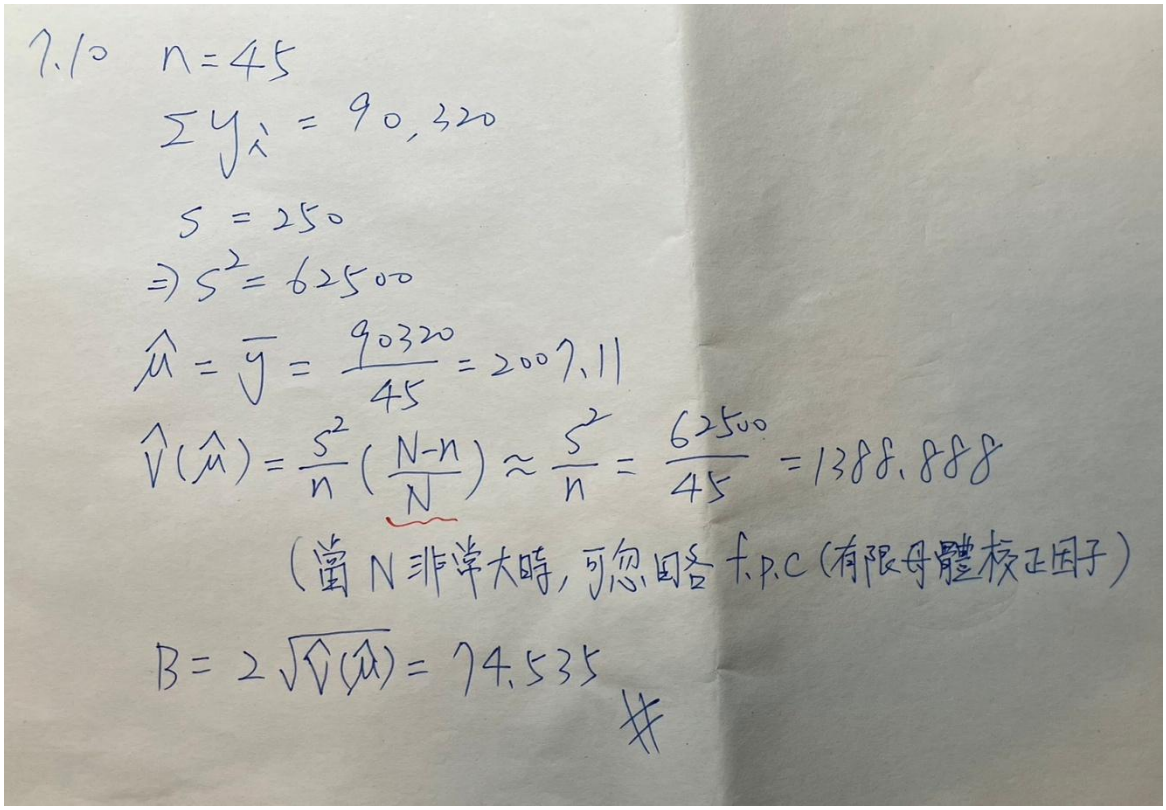


7.9 $\hat{p}_{sy} = \frac{1}{n}\sum y_i = \frac{324}{400} = .81$

$$\hat{V}(\hat{p}_{sy}) = \frac{\hat{p}_{sy}\hat{q}_{sy}}{n-1}\left(\frac{N-n}{N}\right) = \frac{.81(.19)}{399}\left(\frac{2800-400}{2800}\right)$$

$$B = 2\sqrt{\hat{V}(\hat{p}_{sy})} = .036$$

7.10



7.11 $N = 4500 \quad n = 30$

$$\sum y_i = 850 \quad s^2 = 338.64$$

$$\hat{\tau} = N\bar{y}_{sy} = N\bar{y} = 4500(850/30) = 127500$$

$$\hat{V}(\hat{\tau}) = N^2\frac{s^2}{n}\left(\frac{N-n}{N}\right) = (4500)^2\frac{338.64}{30}\left(\frac{4500-30}{4500}\right)$$

$$B = 2\sqrt{\hat{V}(\hat{\tau})} = 30137.06$$

7.17 $N = 650 \quad n = 65 \quad \sum y_i = 48$

$$\hat{p}_{sy} = \frac{1}{n}\sum y_i = \frac{48}{65} = .738$$

$$B = 2\sqrt{\hat{V}(\hat{p}_{sy})} = 2\sqrt{\frac{\hat{p}_{sy}\hat{q}_{sy}}{n-1}\left(\frac{N-n}{N}\right)} = 2\sqrt{\frac{.74(.26)}{64}\left(\frac{650-65}{650}\right)} = .104$$

7.20 $N = 371 \quad n = 53$

$$\sum y_i = 11950 \quad s^2 = 705$$

$$\hat{\mu} = \bar{y} = 11950/53 = 225.47$$

$$\hat{V}(\hat{\mu}) = \frac{s^2}{n}\left(\frac{N-n}{N}\right) = \frac{705}{53}\left(\frac{371-53}{371}\right) = 11.40$$

$$B = 2\sqrt{\hat{V}(\hat{\mu})} = \$6.75$$