Solutions

Each answer shows the steps, then the **result**.

2.1

- $\dfrac{10}{\sqrt{25}} = \dfrac{10}{5} = 2$

2.2

- 1.96

3.1 B

- Dividing by a larger n makes $\mathrm{Var}(\bar{X})$ smaller

3.2

(a)

- $1200 \pm 1.96\dfrac{150}{\sqrt{100}} = 1200 \pm 1.96(15) = 1200 \pm 29.4$; (1170.6, 1229.4)

(b)

- the interval becomes **wider** (a higher confidence level needs a larger z, here 2.576)

3.3

- mean $\bar{x} = \dfrac{120}{8} = 15$; unbiased variance $s^2 = \dfrac{1}{n-1}\left(\sum x^2 - \dfrac{(\sum x)^2}{n}\right) = \dfrac{1}{7}\left(1840 - \dfrac{120^2}{8}\right) = \dfrac{1}{7}(1840 - 1800) = \dfrac{40}{7} = 5.71$

3.4

(a)

- the sample is not random: people leaving a park on a Sunday are likely to favour parks, so they do not represent all residents

(b)

- number the residents 0001 to 8000
- generate random four-digit numbers, ignoring any above 8000 and any repeats, until 50 residents are chosen

(c)

- $\hat{p} = \dfrac{120}{200} = 0.6$
- $0.6 \pm 1.96\sqrt{\dfrac{0.6 \times 0.4}{200}} = 0.6 \pm 0.0679$
- $\mathbf{0.532} < p < \mathbf{0.668}$

3.5

- $\mathrm{E}(\bar{X}) = \mathbf{50}$
- $\mathrm{Var}(\bar{X}) = \dfrac{36}{9} = \mathbf{4}$