Introductory Statistics Tutorial Answers
Chapter 7 – Sampling Distributions of Estimates

1. **(a)** **(i)** $\mu_{\bar{X}} = \mu$ **(ii)** $\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}$

(b) $\bar{X}$ is **exactly** Normally distributed.

(c) **(i)** $\bar{X}$ is **approximately** Normally distributed.

(ii) Central limit theorem.

2. **(a)** **(i)** $\mu_{\hat{P}} = p$ **(ii)** $\sigma_{\hat{P}} = \sqrt{\frac{p(1-p)}{n}}$

(b) For large samples $\hat{P}$ is **approximately** Normally distributed.

3. **(a)** A **parameter** is a numerical characteristic of a population.

(b) An **estimate** is a known quantity calculated from data in order to estimate an unknown parameter.

4. (4)

5. **(a)** $\mu_{\bar{X}} = 7.15$ litres $\sigma_{\bar{X}} = \frac{\sigma_X}{\sqrt{n}} = \frac{1.2}{\sqrt{1}} = 1.2$ litres

(b) $\mu_{\bar{X}} = 7.15$ litres $\sigma_{\bar{X}} = \frac{\sigma_X}{\sqrt{n}} = \frac{1.2}{\sqrt{4}} = 0.6$ litres

(c) $\mu_{\bar{X}} = 7.15$ litres $\sigma_{\bar{X}} = \frac{\sigma_X}{\sqrt{n}} = \frac{1.2}{\sqrt{16}} = 0.3$ litres

6. **(a)** The proportion of university students who belong to the student loan scheme.

(b) $\mu_{\hat{P}} = 0.65$ $\sigma_{\hat{P}} = \sqrt{\frac{0.65(1-0.65)}{50}} = 0.0675$

$\hat{P} \sim$ approx Normal ($\mu = 0.65$, $\sigma = 0.0675$)

(c) pr($\hat{P} > 0.7$) = 1 – 0.7707 = 0.2293

7. $\bar{x} \pm 2 \times \frac{s}{\sqrt{n}}$ $= 10.125 \pm 2 \text{ x } \frac{1.9477}{\sqrt{8}}$

$= (8.75, 11.50)$

8. (5)