CHAPTER 7: STATISTICS

Paper 2

Solution to Question 15

(a) It is given $N = 4$ and $\bar{x} = 55$.

Since $\bar{x} = \frac{\Sigma x}{N}$, so $\Sigma x = \bar{x} \times N$

$= 55 \times 4$

$= 220$

It is given $\sigma = \sqrt{725}$.

Since $\sigma = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$, so $\sqrt{725} = \sqrt{\frac{\Sigma x^2}{4} - 55^2}$

$$725 = \frac{\Sigma x^2}{4} - 55^2$$

$$\frac{\Sigma x^2}{4} = 725 + 55^2$$

$$= 3\,750$$

$$\Sigma x^2 = 15\,000$$

(b) When the number 10 is removed from the set, $\Sigma x = 220 - 10 = 210$

Thus, the new mean, $\bar{x} = \frac{\Sigma x}{N}$

$$= \frac{210}{3}$$

$$= 70$$

The new $\Sigma x^2 = 15\,000 - 10^2 = 14\,900$

The new standard deviation, $\sigma = \sqrt{\frac{\Sigma x^2}{N} - \bar{x}^2}$

$$= \sqrt{\frac{14\,900}{3} - 70^2}$$

$$= \sqrt{\frac{200}{3}}$$

(c) When the extreme value is removed, the mean is increased and the standard deviation is decreased.

Solution to Question 17

(a) It is given $N = 50$ and $\bar{x} = 11$.

Since $\bar{x} = \dfrac{\Sigma fx}{N}$, so $\Sigma fx = \bar{x} \times N$

$= 11 \times 50$

$= 550$

It is given $\sigma^2 = 8$.

Since $\sigma^2 = \dfrac{\Sigma fx^2}{N} - \bar{x}^2$, so $8 = \dfrac{\Sigma fx^2}{50} - 11^2$

$\dfrac{\Sigma fx^2}{50} = 8 + 11^2$

$\Sigma fx^2 = 6\ 450$

(b) When two values from the class interval of 15 – 19 are removed from the set, the new $\Sigma fx = 550 - 2(17)$

$= 516$

Thus, the new mean, $\bar{x} = \dfrac{\Sigma fx}{N}$

$= \dfrac{516}{48}$

$= 10.75$

The new $\Sigma fx^2 = 6\ 450 - 2(17)^2 = 5\ 872$

The new variance, $\sigma^2 = \dfrac{\Sigma fx^2}{N} - \bar{x}^2$

$= \dfrac{5\ 872}{48} - (10.75)^2$

$= 6.77$