Worksheet 1

Exercise 1

(a) $\bar{x}_{mod} = 22$, $\bar{x}_z = 39$, 0.9-quantile $= 54$,

$\bar{x} = 38.34$

(b) $w = 53$, mad $= 10.82$ (w.r.t. median), $s^2 = 178.82$,

$s = 13.37$, $v = \frac{s}{\bar{x}} = 0.35$

Exercise 2

$$\text{overall density} = \frac{\text{total number of students}}{\text{total number of residents}}$$

$$= \frac{300 + 1500 + 800 + 700}{\frac{300}{0.15} + \frac{1500}{0.3} + \frac{200}{0.04} + \frac{800}{0.05} + \frac{700}{0.1}}$$

$$= \frac{3500}{35000} = \underline{0.1} \quad \text{or} \quad \underline{10\,\%}$$

Exercise 3

Annual interest rates :

$i_1 = 1\,\%$, $i_2 = 1\,\%$, $i_3 = 5\,\%$, $i_4 = 5\,\%$,

$i_5 = 5\,\%$, $i_6 = 28\,\%$

Average interest rate :

Consider the geometric mean

$$(1.01 \cdot 1.01 \cdot 1.05 \cdot 1.05 \cdot 1.05 \cdot 1.28)^{\frac{1}{6}} =$$

$$= (1.511543376)^{\frac{1}{6}}$$

$\Rightarrow$ average rate $\underline{\bar{i} = 7.13\,\%}$

Exercise 4

Total number of measurements:

$$n = \sum_{l=1}^{5} n_l = 1000$$

Overall arithmetic mean:

$$\bar{x} = \sum_{l=1}^{5} \frac{n_l}{n} \cdot \bar{x}_l$$

$$= 0.18 \cdot 48.2 + 0.27 \cdot 46.5 + 0.2 \cdot 47.1 +$$

$$+ 0.16 \cdot 49.1 + 0.19 \cdot 47.6$$

$$= \underline{47.55}$$

Overall standard deviation:

$$s^2 = \sum_{l=1}^{5} \frac{n_l}{n} s_l^2 + \sum_{l=1}^{5} \frac{n_l}{n} (\bar{x}_l - \bar{x})^2$$

$$= 0.18 \cdot 36 + 0.27 \cdot 22 + 0.2 \cdot 48 +$$

$$+ 0.16 \cdot 29 + 0.19 \cdot 41 +$$

$$+ 0.18 \cdot (48.2 - 47.55)^2 +$$

$$+ 0.27 \cdot (46.5 - 47.55)^2 +$$

$$+ 0.2 \cdot (47.1 - 47.55)^2 +$$

$$+ 0.16 \cdot (49.1 - 47.55)^2 +$$

$$+ 0.19 \cdot (47.6 - 47.55)^2$$

$$= 35.25$$

$\Rightarrow$ overall standard deviation

$$s = \sqrt{35.25} \approx \underline{\underline{5.94}}$$