Section A

1. $f(x) = c\sqrt{x}$ $\qquad f(x) = \begin{cases} c\sqrt{x}, & x \in [0,4] \\ 0, & \text{otherwise} \end{cases}$

$$\underbrace{\int_{-\infty}^{0} f(x)dx}_{0} + \int_{0}^{4} f(x)\,dx + \underbrace{\int_{4}^{\infty} f(x)\,dx}_{0}$$

$$\boxed{\int_{-\infty}^{\infty} f(x)\,dx = 1}$$

$$c\int_0^4 \sqrt{x}\,dx = 1$$

$$\int \frac{x^{\frac{1}{2}+1}}{n+1} = \frac{2x^{\frac{3}{2}}}{3}\Big|_0^4$$

$$= \frac{2\cdot 0^{\frac{3}{2}}}{3} + \frac{2\cdot 4^{\frac{3}{2}}}{3} = 5.33 = \frac{16}{3}$$

$$c \cdot \frac{16}{3} = 1$$

$$\frac{\;\;}{\frac{16}{3}} \quad \frac{1}{\frac{16}{3}}$$

$$\boxed{C = \frac{3}{16}}$$

2. a) $\frac{3+3+2+1+4+45+5}{7} = \boxed{9}$

b) $[\cancel{1}, \cancel{2}, \cancel{3}, \underline{3}, \cancel{4}, \cancel{5}, \cancel{45}]$ $\qquad \boxed{3}$

c) The median is preffered to summarize the above data set because the median is not greatly affected (if at all) by the outlier 45. The mean however is greatly affected and causes the mean to not be highly representative of the entire data set.

3. $P(\frac{1}{3} \leq x \leq \frac{2}{3}) = \int_{\frac{1}{3}}^{\frac{2}{3}} f(x)dx = \int_{\frac{1}{3}}^{\frac{2}{3}} 2x - x^2$

$$= \int_{\frac{1}{3}}^{\frac{2}{3}} 2\int x - \int_{\frac{1}{3}}^{\frac{2}{3}} x^2 = 2\cdot\frac{x^2}{2}\Big|_{\frac{1}{3}}^{\frac{2}{3}} - \frac{x^3}{3}\Big|_{\frac{1}{3}}^{\frac{2}{3}} = x^2 - \frac{x^3}{3}\Big|_{\frac{1}{3}}^{\frac{2}{3}}$$

$$\Rightarrow x^2 - \frac{x^3}{3}\Big|_{\frac{1}{3}}^{\frac{2}{3}}$$

$$= \frac{20}{81}$$

$$\boxed{= \frac{20}{81}}$$