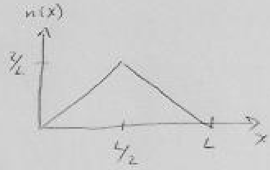
iv) $n(x) = \begin{cases} \frac{4x}{L^2} & \text{for } 0 \le x \le L/2 \\ \frac{4(L-x)}{L^2} & \text{for } L/2 \le x \le L \\ 0 & \text{otherwise} \end{cases}$



note, from figure, it is obvious that $\bar{x} = L/2$ an $n(x)$ is normalized properly - <u>always</u> make a plot!

$$\bar{x} = \int_{\text{all } x} x\, n(x)\, dx = \int_0^{L/2} \frac{4x^2}{L^2} dx + \int_{L/2}^{L} \frac{4(L-x)x}{L^2} dx$$

$$\bar{x} = \frac{4}{L^2}\int_0^{L/2} x^2 dx + \frac{4}{L}\int_{L/2}^{L} x\, dx - \frac{4}{L^2}\int_{L/2}^{L} x^2 dx$$

$$\bar{x} = \frac{L}{6} + 2L - L/2 - \frac{4L}{3} + L/6 = \tfrac{1}{2}L \quad \text{as expected!}$$

$$s^2 = \int_{\text{all } x} (x-\bar{x})^2 n(x)\, dx = \int_0^{L/2} \frac{4x}{L^2}(x - L/2)^2 dx + \underbrace{\int_{L/2}^{L} \frac{4(L-x)}{L^2}(x-L/2)^2 dx}_{\text{same as first term, which you can see by letting } y = L - x}$$

$$s^2 = \frac{8}{L^2}\int_0^{L/2} x\left(x^2 + \frac{L^2}{4} - xL\right) dx$$

$$s^2 = \frac{8}{L^2}\int_0^{L/2} x^3 dx + 2\int_0^{L/2} x\, dx - \frac{8}{L}\int_0^{L/2} x^2 dx$$

$$s^2 = \left(\frac{1}{8} + \frac{1}{4} - \frac{1}{3}\right)L^2 = 0.0417L^2$$

$$s = 0.204L$$

v) for

i) $\frac{s}{\bar{x}} = 0.648$
iii) $\frac{s}{\bar{x}} = 0.578$
} similar (flat distributions)

ii) $s/\bar{x} = 0.408$
iv) $\frac{s}{\bar{x}} = 0.408$
} similar (triangular)