1.2) i) $\bar{x} = \frac{\sum x_i}{N}$ $N = 13$

$\bar{x} = \frac{0+1+2+3+\cdots+12}{13} = \frac{78}{13} = 6$

$s^2 = \frac{1}{N-1} \sum (x_i - \bar{x})^2$

$s^2 = \frac{1}{12}\left[2\times6^2 + 2\times5^2 + 2\times4^2 + 2\times3^2 + 2\times2^2 + 1\right]$

$s^2 = \frac{182}{12} = 15.17$ $\quad s = 3.89$

$u^2 = \frac{s^2}{N} = 1.17$ $\quad u = 1.08$

ii) $\bar{x} = \frac{\sum m_i x_i}{\sum m_i} = \frac{(0+1\times1+2\times2+3\times3+4\times4+5\times5+6\times6+7\times5+8\times4+9\times3+10\times2+11\times1+0)}{0+1+2+3+4+\cdots+2+1+0}$

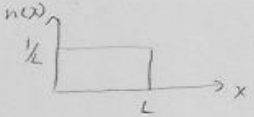
$\bar{x} = \frac{216}{36} = 6.00$

$s^2 = \frac{\sum m_i (x_i - \bar{x})^2}{\sum m_i - 1} = \frac{(0+1\times5^2+2\times4^2+3\times3^2+4\times2^2+5+0+5+4\times2^2+3\times3^2+2\times4^2+5^2+0)}{36-1}$

$s^2 = \frac{210}{35} = 6.00$ $\quad s = 2.45$

$u^2 = \frac{s^2}{\sum m_i} = \frac{L}{36} = 0.167$ $\quad u = 0.408$

iii)



$\bar{x} = \int_{all\,x} x\, n(x)\, dx = \frac{1}{L}\int_0^L x\, dx = \frac{1}{2}\frac{1}{L}x^2\Big|_0^L = \frac{L}{2}$

expected from figure

$s^2 = \int_{all\,x} (x-\bar{x})^2 n(x)\, dx = \frac{1}{L}\int_0^L (x-\frac{L}{2})^2 dx = \frac{1}{L}\int_0^L x^2 dx + \frac{L}{4}\int_0^L dx - \int_0^L x\, dx$

$s^2 = \frac{1}{3}L^2 + \frac{1}{4}L^2 - \frac{1}{2}L^2 = \frac{L^2}{12}$

$s = \frac{L}{2\sqrt{3}} = 0.289L$