If $z_i = a + bx_i$, for $i = 1, 2, \ldots, n$

then $\bar{z} = \frac{1}{n} \sum_{i=1}^{n} z_i = \frac{1}{n} \sum_{i=1}^{n} (a + bx_i)$

$$= \frac{1}{n} \left[\sum_{i=1}^{n} (a) + \sum_{i=1}^{n} (bx_i) \right]$$

$$= \frac{1}{n} \left[na + b \sum_{i=1}^{n} x_i \right]$$

$$= a + b \frac{1}{n} \sum_{i=1}^{n} x_i = a + b\bar{x}$$

also

$$\sigma_z^2 = \frac{1}{n} \sum_{i=1}^{n} (z_i - \bar{z})^2$$

$$= \frac{1}{n} \sum_{i=1}^{n} \left[(\cancel{a} + bx_i) - (\cancel{a} + b\bar{x}) \right]^2$$

$$= \frac{1}{n} b^2 \sum_{i=1}^{n} (x_i - \bar{x})^2 = b^2 \sigma_x^2$$

$\frac{1}{2} \sum_{i=1}^{2} (X_i - \bar{X})$ $\frac{1}{1} \sum_{i=1}^{2} (X_i - \bar{X})^2$

"pop. var. of samp" "samp var of samp"

$\frac{1}{2} \sum_{i=1}^{n} (X_i - \mu)^2$