Formulas

$$\mu = E(X) = \sum_{i=1}^{N} x_i \; P(X = x_i)$$

$$Variance(X) = Var(X) = E(X-\mu)^2 = E(X^2) - (E(X))^2$$
$$= \sum_{i=1}^{N} (x_i - \mu)^2 \; P(X = x_i)$$

$$P(X = x) = \binom{n}{x} p^x (1-p)^{n-x}, x = 0, 1, \dots, n$$

$$E(X) = np \qquad Var(X) = np(1-p)$$

$$P(X = x) = \frac{e^{-\lambda}\lambda^x}{x!}, x = 0, 1, \dots \qquad \lambda = E(X) = Var(X)$$

$$\chi^2 = \frac{(n-1)S^2}{\sigma^2} \qquad \frac{(n-1)S^2}{\chi^2_{n-1,\frac{\alpha}{2}}} < \sigma^2 < \frac{(n-1)S^2}{\chi^2_{n-1,1-\frac{\alpha}{2}}}$$

$$Z = \frac{x-\mu}{\sigma} \qquad Z = \frac{\bar{x}-\mu}{\frac{\sigma}{\sqrt{n}}} \qquad Z = \frac{\bar{x}-\mu}{\frac{S}{\sqrt{n}}} \qquad t = \frac{\bar{x}-\mu}{\frac{S}{\sqrt{n}}}$$

$$\bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}} \qquad \bar{x} \pm Z_{\frac{\alpha}{2}} \frac{S}{\sqrt{n}} \qquad \bar{x} \pm t_{n-1,\frac{\alpha}{2}} \frac{S}{\sqrt{n}}$$

$$p \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{p(1-p)}{n}}$$

$$Z = \frac{p-\pi}{\sqrt{\frac{\pi(1-\pi)}{n}}} \qquad Z = \frac{p-\pi}{\sqrt{\frac{p(1-p)}{n}}}$$

$$f_X(x) = \sum_{j=1}^{\infty} f(x, y_j) \qquad f(x|y) = \frac{f(x,y)}{f_Y(y)}$$

$$E(X|Y = y) = \sum_{i-1}^{\infty} x_i \; f(x_i|y)$$

$$Cov(X,Y) = E\big(X - E(X)\big)\big(Y - E(Y)\big) = E(XY) - E(X)E(Y)$$

$$E(XY) = \sum_{i=1}^{\infty}\sum_{j=1}^{\infty} x_i\, y_j f(x_i, y_j) \qquad E(Y) = \sum_{j=1}^{\infty} y_j\, f_Y(y_j)$$

$$S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2 = \frac{1}{n-1}\left(\sum_{i=1}^{n} x_i^2 - n\bar{x}^2\right)$$

$$Var(X+Y) = Var(X) + Var(Y) + 2Cov(X,Y)$$

$$\frac{\sum_{i=1}^{k} p_{it}q_{i0}}{\sum_{i=1}^{k} p_{i0}q_{i0}} \times 100 \qquad \frac{\sum_{i=1}^{k} p_{it}q_{it}}{\sum_{i=1}^{k} p_{i0}q_{it}} \times 100$$

$$Purchase\ power = \frac{1}{CPI} \times 100$$