Appendix A

Formula Book

Chapter 2

Simple interest:

$$I = Prt$$

Amount:

$$S = P + I = P + Prt = P(1 + rt)$$

Present Value:

$$P = \frac{S}{1 + rt} = S(1 + rt)^{-1}$$

Compound Amount:

$$S = P(1 + i)^n,$$

Present Value:

$$P = \frac{S}{(1 + i)^n} = S(1 + i)^{-n}$$

Chapter 3

Unit Variable Cost:

$$UVC = \frac{TVC}{n}$$

Net Income using a total revenue and total cost approach:

$$NI = n(S) - (TFC + n(UVC))$$

Unit Contribution Margin:

$$UCM = S - UVC$$

Net Income using a total contribution margin approach:

$$NI = n(UCM) - TFC$$

Contribution Rate:

$$CR = \frac{UCM}{S} \times 100\%$$

or

$$CR = \frac{TR - TVC}{TR} \times 100\%$$

Break-even Analysis in units:

$$n = \frac{TFC}{S - UVC} = \frac{TFC}{UCM}$$

Break-even Analysis in dollars:

$$TR = \frac{TFC}{CR}$$

Return On Investment:

$$\texttt{ROI} = \frac{\texttt{Current Value of Investment} - \texttt{Cost of Investment}}{\texttt{Cost of Investment}}$$

Annualized ROI:

$$\texttt{Annualized ROI} = (1 + \texttt{ROI})^{\frac{1}{\texttt{number of years}}} - 1$$

or

$$\texttt{Annualized ROI} = \left(\frac{\texttt{Ending Value}}{\texttt{Beginning Value}}\right)^{\frac{1}{\texttt{number of years}}} - 1$$

Chapter 4

$$\texttt{Relative frequency} = \frac{\texttt{Frequency}}{n}$$

$$\texttt{Percentage} = \texttt{Relative frequency} \times 100\%$$

Chapter 5

Sample Mean:

$$\bar{x} = \frac{\sum x_i}{n}$$

Population mean:

$$\mu = \frac{\sum x_i}{N}$$

Position of the Median:

$$\texttt{Position of the Median} = 0.5(n + 1)$$

Variance of a Population:

$$\sigma^2 = \frac{\sum(x_i - \mu)^2}{N}$$

Calculating formula for Variance of a Population:

$$\sigma^2 = \frac{\sum x_i^2}{N} - \left(\frac{\sum x_i}{N}\right)^2,$$

Variance of a Sample:

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

Calculating formula for Variance of a Sample:

$$s^2 = \frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1}$$

Chapter 6

Correlation Coefficient:

$$r = \frac{s_{xy}}{s_x s_y}$$

where s_{xy} is called the **covariance** between x and y:

$$s_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{n-1}$$

Computing formula for covariance:

$$s_{xy} = \frac{\sum x_i y_i - \frac{(\sum x_i)(\sum y_i)}{n}}{n-1}$$

The slope of the linear regression line $y = a + bx$:

$$b = r\frac{s_y}{s_x}$$

The y-intercept of the linear regression line $y = a + bx$:

$$a = \bar{y} - b\bar{x}$$

Chapter 7

Multiplicative Decomposition of Time Series:

$$Y_t = T_t \times S_t \times I_t$$

Exponential Smoothing:

$$F_n = F_{n-1} + \alpha(A_{n-1} - F_{n-1})$$

Or

$$F_n = (1 - \alpha)F_{n-1} + \alpha A_{n-1}$$