

Common Formulas MAT 135P Math for Liberal Arts Plus

Math Skills Formulas for Linear Programming

Slope of a line containing the points (x_1, y_1) and (x_2, y_2) is given by: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Slope-Intercept form of a line: $y = mx + b$

Point-Slope form of a line: $y - y_1 = m(x - x_1)$

Applications Formulas for Finance

Simple Interest Formulas: $I = Prt$

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

Contemporary Mathematics Version: $T = P + Prt$

Compound Interest Formula: $A = P\left(1 + \frac{r}{m}\right)^{mt} = P(1 + i)^n$

Contemporary Mathematics Version: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

Effective Annual Rate (EAR) Formula: $R = \left(1 + \frac{r}{m}\right)^m - 1$

Contemporary Mathematics Version (Effective Annual Yield): $Y = \left(1 + \frac{r}{n}\right)^n - 1$

Continuous Interest Formula: $A = Pe^{rt}$

Savings Formula: $A = d \left[\frac{\left(1 + \frac{r}{m}\right)^{mt} - 1}{\frac{r}{m}} \right] = d \left[\frac{(1 + i)^n - 1}{i} \right]$

Contemporary Mathematics Version: $FV = pmt \left[\frac{\left(1 + \frac{r}{n}\right)^{nt} - 1}{\frac{r}{n}} \right]$

Payment Formula: $d = A \left[\frac{\frac{r}{m}}{\left(1 + \frac{r}{m}\right)^{mt} - 1} \right] = A \left[\frac{i}{(1 + i)^n - 1} \right]$

Contemporary Mathematics Version: $pmt = FV \left[\frac{\frac{r}{n}}{\left(1 + \frac{r}{n}\right)^{nt} - 1} \right]$

Present Value Formula: $P = \frac{A}{\left(1 + \frac{r}{m}\right)^{mt}} = \frac{A}{(1 + i)^n}$

Contemporary Mathematics Version: $PV = \frac{A}{\left(1 + \frac{r}{n}\right)^{nt}}$

Amortization Payment Formula: $d = P \left[\frac{\frac{r}{m}}{1 - \left(1 + \frac{r}{m}\right)^{-mt}} \right] = P \left[\frac{i}{1 - (1 + i)^{-n}} \right]$

Contemporary Mathematics Version: $pmt = P \left[\frac{\frac{r}{n} \left(1 + \frac{r}{n}\right)^{nt}}{\left(1 + \frac{r}{n}\right)^{nt} - 1} \right]$

Math Skills Formulas for Statistics

Slope of a line containing the points (x_1, y_1) and (x_2, y_2) is given by: $m = \frac{y_2 - y_1}{x_2 - x_1}$

Slope-Intercept form of a line: $y = mx + b$

Point-Slope form of a line: $y - y_1 = m(x - x_1)$

Applications Formulas for Statistics

Formula for the Mean: $\bar{x} = \frac{x_1 + x_2 + \dots + x_n}{n} = \frac{1}{n} \sum_{i=1}^n x_i$

Standard Deviation Formula:

$$s = \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + (x_3 - \bar{x})^2 + \dots + (x_n - \bar{x})^2}{n - 1}} = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1}}$$

Formula for Correlation Coefficient:

$$r = \frac{1}{n - 1} \left[\left(\frac{x_1 - \bar{x}}{s_x} \right) \left(\frac{y_1 - \bar{y}}{s_y} \right) + \left(\frac{x_2 - \bar{x}}{s_x} \right) \left(\frac{y_2 - \bar{y}}{s_y} \right) + \dots + \left(\frac{x_n - \bar{x}}{s_x} \right) \left(\frac{y_n - \bar{y}}{s_y} \right) \right] = \frac{1}{n - 1} \sum_{i=1}^n \left(\frac{x_i - \bar{x}}{s_x} \right) \left(\frac{y_i - \bar{y}}{s_y} \right)$$

The regression line's slope m is given by: $m = r \cdot \frac{s_y}{s_x}$

The regression line's y -intercept b is given by: $b = \bar{y} - m\bar{x}$

Equation of the least squares regression line: $\hat{y} = mx + b$