PDF 2.040 Derivatives Not in Terms of x

Every time that we state a rate of change, we state that rate of change with respect to something.

For instance, if we talk about speed, we are talking about distance with respect to time.

When we discuss slope on a Cartesian plane, we use the formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

In other words, we talk about the change in y with respect to x.

Similarly, when we determine a derivative (which is just an instantaneous rate of change, or slope at a point), we determine the derivative with respect to something. Usually, we determine a derivative with respect to x.

However, this isn't always the case.

Example

Suppose $y = 3(2x^2 + x - 1)^4$. Determine $\frac{dy}{dx}$

Example

Suppose $y = 3(2x^2 + x - 1)^4$. Determine $\frac{dy}{d(2x^2+x-1)}$

Example

Determine $\frac{d[4(2x^2+8x+3)]}{dx}$

Example

Determine $\frac{d\left[(3x^2-2x+2)^3\right]}{d(3x^2-2x+2)}$

Example

Determine $\frac{d(2x^2+12x+18)}{d(x+3)}$