Formulas for mathematics:

Line through point (s,t) with slope a: $y - t = a(x - s)$

Line through points (s_1,t_1) and (s_2,t_2): $y - t_1 = \frac{t_2 - t_1}{s_2 - s_1}(x - s_1)$

$$f(x) = ax^2 + bx + c = 0 \quad \textit{for} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Inverses:

$$f(x) = x^a \qquad f^{-1}(y) = y^{1/a} \qquad (a \neq 0;\ x, y > 0)$$
$$f(x) = a^x \qquad f^{-1}(y) = {}^a\!\log y \qquad (a > 0)$$

Important derivatives

$$f(x) = x^a \qquad f'(x) = ax^{a-1} \qquad (a \neq 0)$$
$$f(x) = a^x \qquad f'(x) = a^x \ln a \qquad (a > 0)$$
$$f(x) = {}^a\!\log x \qquad f'(x) = \frac{1}{x \ln a} \qquad (a > 0)$$

Rules for derivatives

Let $f'(x)$ and $g'(x)$ exist, then

Operation	Function	Derivative
Sum	$f(x) \pm g(x)$	$f'(x) \pm g'(x)$
Product	$f(x) \cdot g(x)$	$f'(x) \cdot g(x) + f(x) \cdot g'(x)$
Quotient	$\frac{f(x)}{g(x)}$	$\frac{g(x)f'(x) - f(x)g'(x)}{g^2(x)}$
Composition	$f(g(x))$	$f'(g(x))g'(x)$

Relative rate of increase: $\frac{f'(x)}{f(x)}$

Elasticity: $EL_x f(x) = \frac{x}{f(x)} f'(x)$

Let $f(x,y)$ have a stationary point (x_0, y_0)

Minimum	$f_{xx}(x_0,y_0) > 0$	$f_{yy}(x_0,y_0) > 0$	$f_{xx}f_{yy} - (f_{xy})^2 > 0$
Maximum	$f_{xx}(x_0,y_0) < 0$	$f_{yy}(x_0,y_0) < 0$	$f_{xx}f_{yy} - (f_{xy})^2 > 0$
Saddle - point			$f_{xx}f_{yy} - (f_{xy})^2 < 0$