A few useful mathematical functions for Data Science:

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Taylor Series Expansion: For a function $f(x)$, expansion about $x = a$

$$f(x) = f(a) + f'(a)(x-a) + f''(a)\frac{(x-a)^2}{2!} + \ldots + f^{(k)}(a)\frac{(x-a)^k}{k!} + R_k$$

where $f^{(m)}(a)$ denotes the m^{th} derivative of f evaluated at a and for some $\bar{a}$ between a and x,

$$R_k = f^{(k+1)}(\bar{a})\frac{(x-a)^{k+1}}{(k+1)!}$$

Convex function: A function h is convex for any $0 \leq \alpha \leq 1$,

$$h(\alpha x + (1-\alpha)y) \leq \alpha h(x) + (1-\alpha)h(y),$$

for all values of x and y. If $-h$ is convex, then h is concave.