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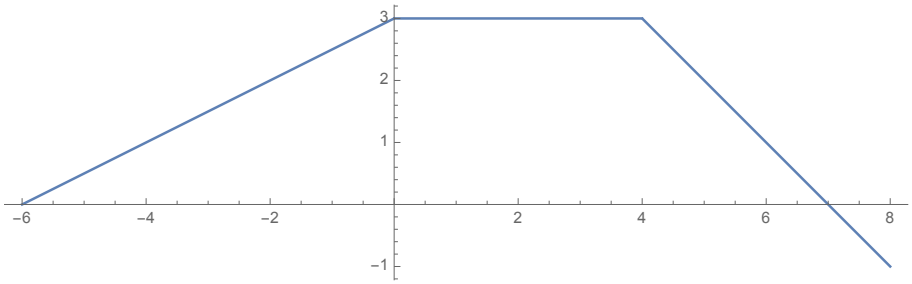
Mathematics and Methods in Machine Learning and Neural Networks
Mathematics / Home Exercises 2

1. A graph of a function f is below. Plot (by hand) f' for $x \in [-6, 8]$.



2. Let $f(x) = 3x^2+5x$. Calculate the derivative $f'(x)$ using the formula

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}.$$

3. Calculate $f'(x)$, when $f(x)$ is

a) x^3 b) $6x^{10}$ c) $\dfrac{5}{x^3}$.

4. Calculate $f'(x)$, when $f(x)$ is

a) $\dfrac{x^3}{3} + 1$ b) $x^2 + 4x + 3$ c) $\displaystyle\sum_{k=1}^{5}(a_k x + b_k)$.

5. Calculate $f'(x)$, when $f(x)$ is

a) $4\sin(x) - 10\cos(x)$ b) $x^2 \ln x$ c) $\dfrac{x^2 + 7}{2x - 3}$.

6. Calculate $f'(x)$, when $f(x)$ is

a) $(2x + 4)^5$ b) $3\sin 4x$ c) $\dfrac{1}{1 + e^{-(ax+b)}}$.