Differentiation Cheat Sheet

Differentiation Rules

Rule Name	Definition
Constant Function Rule	$$\frac{d}{dt}C = 0$$
Scalar Multiple Rule	$$\frac{d}{dt}[cu(t)] = cu'(t)$$
Sum Rule	$$\frac{d}{dt}[u(t) + v(t)] = u'(t) + v'(t)$$
Product Rule	$$\frac{d}{dt}[f(t)u(t)] = f'(t)u(t) + f(t)u'(t)$$
Dot Product Rule	$$\frac{d}{dt}[u(t) \cdot v(t)] = u'(t) \cdot v(t) + u(t) \cdot v'(t)$$
Cross Product Rule	$$\frac{d}{dt}[u(t) \times v(t)] = u'(t) \times v(t) + u(t) \times v'(t)$$
Quotient Rule	$$\frac{d}{dt}[f(t)/u(t)] = \frac{u(t)f'(t) = f(t)u'(t)}{u(t)^2}$$
Chain Rule	$$\frac{d}{dt}[u(f(t)))] = f'(t)u'(f(t))$$