

# 1 | lamar chain rule

## 1.1 | 4

$$\frac{\partial}{\partial w} \sqrt{w^3 + 8w^2} = \frac{(3w^2 + 16w)}{2\sqrt{w^3 + 8w^2}}$$

## 1.2 | 8

$$\frac{\partial}{\partial x} \tan(1 - 2e^x) = -2e^x \sec^2(1 - 2e^x)$$

## 1.3 | 9

$$\frac{\partial}{\partial z} \cos(\sin(z) + z^2) = -\sin(\sin x + x^2)(\cos x + 2x)$$

## 1.4 | 13

$$\frac{\partial}{\partial z} e^{12z - z^6} = e^{12z - z^6} (12 - 6z^5)$$

## 1.5 | 42

$$\frac{\partial}{\partial v} \sqrt{\frac{e^v}{7+2v}} = \frac{1}{2\sqrt{\frac{e^v}{7+2v}}} \frac{(7+2v)e^v - 2e^v}{(7+2v)^2} = \frac{(5+2v)e^v}{2(7+2v)^2 \sqrt{\frac{e^v}{7+2v}}}$$

## 1.6 | 43

$$\frac{\partial}{\partial x} \sqrt{x^2 + \sqrt{1+4x}} = \frac{1}{2\sqrt{x^2 + \sqrt{1+4x}}} \left( 2x + \frac{4}{2\sqrt{1+4x}} \right) = \frac{x + \frac{1}{\sqrt{1+4x}}}{\sqrt{x^2 + \sqrt{1+4x}}}$$