

# Practice Quiz 5

$$1) f(x) = \sqrt{(4x - \sin(3x))'} = (4x - \sin(3x))^{\frac{1}{2}}$$

$$\begin{aligned} f'(x) &= \frac{1}{2} (4x - \sin(3x))^{-\frac{1}{2}} (4 - \cos(3x)(3)) \\ &= \frac{1(4 - 3\cos(3x))}{2\sqrt{4x - \sin(3x)}} \end{aligned}$$

$$2) f(x) = \ln(\ln(7x))$$

$$\begin{aligned} f'(x) &= \left(\frac{1}{\ln(7x)}\right) \left(\frac{1}{7x}\right) (7) \\ &= \frac{1}{x \ln(7x)} \end{aligned}$$

$$3) f(x) = 12 (\tan(4x))^2$$

$$\begin{aligned} f'(x) &= 12(2)(\tan(4x))' (\sec^2(4x))(4) \\ &= 96 \tan(4x) \sec^2(4x) \end{aligned}$$

$$4) f(x) = 9^{\sec(x)}$$

$$f'(x) = \left(9^{\sec(x)} (\ln(9))\right) (\sec(x) \tan(x))$$

$$f'(x) = 9^{\sec(x)} \ln(9) \sec(x) \tan(x)$$

$$5) f(x) = 6x^{\frac{1}{2}} - \cot(x) + 12$$

$$f'(x) = 6\left(\frac{1}{2}\right)x^{-\frac{1}{2}} - (-\csc^2(x))$$

$$= \frac{3}{\sqrt{x}} + \csc^2(x)$$

$$6) f(x) = -3xe^x - 4e^x$$

$$f'(x) = (-3)(e^x) + (-3x)(e^x) - 4e^x$$

$$= -3e^x - 3xe^x - 4e^x$$

$$= -7e^x - 3xe^x$$

$$7) f(x) = \log_{10}(7x - 11)$$

$$f'(x) = \frac{1}{(7x-11)(\ln(10))} \quad (7)$$

$$= \frac{7}{(7x-11)(\ln(10))}$$

$$8) f(x) = (4-x^2)^{-\frac{1}{3}}$$

$$f'(x) = -\frac{1}{3}(4-x^2)^{-\frac{4}{3}}(-2x)$$

$$= \frac{2x}{2^{\frac{4}{3}}\sqrt[3]{(4-x^2)^4}}$$

$$9) f(x) = (\sec(x))^3 - \tan(2x)$$

$$f'(x) = 3(\sec(x))^2(\sec(x)\tan(x)) - \sec^2(2x)(2)$$

$$= 3\sec^3(x)\tan(x) - 2\sec^2(2x)$$

$$10) f(x) = u(v(x))$$

$$f'(x) = u'(v(x)) \cdot v'(x) \leftarrow \begin{array}{l} \text{chain rule in symbols} \\ \text{der. of outside function w/o} \\ \text{changing inside function times} \\ \text{der of inside function} \end{array}$$

$$f'(2) = u'(v(2)) \cdot v'(2)$$

$$f'(2) = u'(4) \cdot v'(2) = (-3)(-4) = \boxed{12}$$

$$11) \frac{d}{dx} \left( \frac{u}{v} \right) = \frac{u'v - uv'}{v^2} \leftarrow \text{Quotient rule}$$

$$\frac{d}{dx} \left( \frac{u}{v} \right) @ x = -1 \text{ is } \frac{u'(-1)v(-1) - u(-1)v'(-1)}{(v(-1))^2}$$

$$\frac{(10)(8) - (6)(2)}{(8)^2} = \frac{80 - 12}{64} = \boxed{\frac{68}{64}}$$