

AP Calculus AB

4.4 day 2 Triage Practice

For each problem, identify both the base and the exponent as either a constant (C) or a variable (V). Use this identification to decide whether to use the power rule or the exponential rule (or neither) to differentiate the expression, then complete the derivative. You do not need to simplify your answers.

$$1. \frac{d}{dx}(5^{2x+3}) = \boxed{C}^{\boxed{V}} \text{ exp.}$$

$$5^{2x+3} \cdot \ln 5 \cdot 2$$

$$2. \frac{d}{dx}(\sin^6 x) = \frac{d}{dx}(\sin x)^6 \quad \boxed{V}^{\boxed{C}} \text{ power}$$

$$= 6 \sin^5 x \cdot \cos x$$

$$3. \frac{d}{dx}(\pi^{e^2-5}) = \boxed{C}^{\boxed{C}} \text{ constants}$$

$$= 0$$

$$4. \frac{d}{dx}\left((3x^2 - 2x + 5)^{3 \sin \frac{\pi}{2}}\right) = \boxed{V}^{\boxed{C}} \text{ power}$$

$$\sin \frac{\pi}{2} = 1$$

$$3(3x^2 - 2x + 5)^2 \cdot (6x - 2)$$

$$5. \frac{d}{dx}(\sqrt[3]{x^6 - 2x}) = \frac{d}{dx}(x^6 - 2x)^{\frac{1}{3}} \quad \boxed{V}^{\boxed{C}} \text{ power}$$

$$= \frac{1}{3}(x^6 - 2x)^{-\frac{2}{3}} \cdot (6x^5 - 2)$$

$$6. \frac{d}{dx}(x^{\sqrt{3}+1}) = (\sqrt{3}+1)x^{\sqrt{3}} \quad \boxed{V}^{\boxed{C}} \text{ power}$$

$$7. \frac{d}{dx}(\cos^x 2\pi) = \frac{d}{dx}(\cos 2\pi)^x \quad \boxed{C}^{\boxed{V}} \text{ exp.}$$

$$\cos 2\pi = 1$$

$$= \frac{d}{dx}(1)^x$$

$$= 1^x \cdot \ln 1$$

$$= 1^x \cdot 0 = 0$$

$$8. \frac{d}{dx}(x^{\sin x}) = \boxed{V}^{\boxed{V}} \text{ log. diff.}$$

$$\ln y = \ln x^{\sin x}$$

$$\ln y = \sin x \cdot \ln x$$

$$\frac{1}{y} \cdot \frac{dy}{dx} = \sin x \cdot \frac{1}{x} + \cos x \ln x$$

$$\frac{dy}{dx} = y \left(\frac{\sin x}{x} + \cos x \ln x \right)$$

$$\frac{dy}{dx} = x^{\sin x} \left(\frac{\sin x}{x} + \cos x \ln x \right)$$