
Complete the following problems. Calculate the following derivatives. You do not need to simplify. Show all work to receive full credit.

1. $\frac{d}{dx} \left(x^7 + \sqrt{7} x - \frac{1}{\pi + 1} \right)$

$$= 7x^6 + \sqrt{7}$$

2. $\frac{d}{dx} (x^2 \sin(2x + 3))$

$$\begin{aligned} &= 2x \sin(2x + 3) + \cos(2x + 3) \cdot 2 \cdot x^2 \\ &= 2x \sin(2x + 3) + 2x^2 \cos(2x + 3) \end{aligned}$$

3. $\frac{d}{dx} \left(\frac{\tan x}{e^x + \pi^x} \right)$

$$= \frac{\sec^2 x (e^x + \pi^x) - (e^x + \pi^x \ln \pi) \tan x}{(e^x + \pi^x)^2}$$

4. $\frac{d}{dx} (xe^{4x} + \ln(\cos^2 x))$

$$\begin{aligned} &= e^{4x} + 4xe^{4x} - \frac{1}{\cos^2 x} \cdot 2 \cos x \sin x \\ &= e^{4x} + 4xe^{4x} - \frac{2 \sin x}{\cos x} \end{aligned}$$