

Name (print) _____ Discussion hour (T Th ____)

1. (6 pts.) Find $f'(x)$, where $f(x) = (x + 7x^3 + x^{-5})(5^x + \cos x)$. (No need to simplify.)

Solution:

$$\begin{aligned} f'(x) &= (x + 7x^3 + x^{-5})'(5^x + \cos x) + (x + 7x^3 + x^{-5})(5^x + \cos x)' \\ &= \boxed{(1 + 21x^2 - 5x^{-6})(5^x + \cos x) + (x + 7x^3 + x^{-5})((5^x) \ln 5 - \sin x)} \end{aligned}$$

(3 points for each summand)

2. (6 pts.) Find $\frac{dy}{dz}$, where $y = \frac{\sin 2z + e^{3z}}{4 + 5z^6}$. (No need to simplify.)

Solution:

$$\begin{aligned} \frac{dy}{dz} &= \frac{(\sin 2z + e^{3z})'(4 + 5z^6) - (\sin 2z + e^{3z})(4 + 5z^6)'}{(4 + 5z^6)^2} \\ &= \boxed{\frac{(2 \cos 2z + 3e^{3z})(4 + 5z^6) - (\sin 2z + e^{3z})(30z^5)}{(4 + 5z^6)^2}} \end{aligned}$$

(4 points for numerator, 2 points for denominator)

3. (8 pts.) Find $g'(\theta)$, where $g(\theta) = (1 + (1 + \theta^2)^{1/5})^{1/2}$. (No need to simplify.)

Solution: $g'(\theta) = \boxed{\frac{1}{2} (1 + (1 + \theta^2)^{1/5})^{-1/2} \left(\frac{1}{5} (1 + \theta^2)^{-4/5} (2\theta) \right)}$ (3, 3, 2 for the three applications of chain rule).

Name (print) _____ Discussion hour (T Th ___)

1. (6 pts.) Find $f'(x)$, where $f(x) = (x + 6x^4 + x^{-8})(4^x + \tan x)$. (No need to simplify.)

Solution:

$$\begin{aligned} f'(x) &= ((x + 6x^4 + x^{-8})'(4^x + \tan x) + (x + 6x^4 + x^{-8})(4^x + \tan x)') \\ &= \boxed{(1 + 24x^3 - 8x^{-9})(4^x + \tan x) + (x + 6x^4 + x^{-8})(4^x \ln 4 - \sec^2 x)} \end{aligned}$$

(3 points for each summand)

2. (6 pts.) Find $\frac{dy}{dz}$, where $y = \frac{\cos 3z + e^{4z}}{5 + 6z^7}$. (No need to simplify.)

Solution:

$$\begin{aligned} \frac{dy}{dz} &= \frac{(\cos 3z + e^{4z})'(5 + 6z^7) - (\cos 3z + e^{4z})(5 + 6z^7)'}{(5 + 6z^7)^2} \\ &= \boxed{\frac{(-3 \sin 3z + 4e^{4z})(5 + 6z^7) - (\cos 3z + e^{4z})(42z^6)}{(5 + 6z^7)^2}} \end{aligned}$$

(4 points for numerator, 2 points for denominator)

3. (8 pts.) Find $g'(\theta)$, where $g(\theta) = (1 + (1 + 3\theta)^{1/5})^{1/4}$. (No need to simplify.)

Solution: $g'(\theta) = \boxed{\frac{1}{4} (1 + (1 + 3\theta)^{1/5})^{-3/4} \left(\frac{1}{5} (1 + 3\theta)^{-4/5} (3) \right)}$ **(3, 3, 2 for the three applications of chain rule).**