

Name

MUN Number

1. Differentiate each of the following functions. Make any obvious simplifications.

[5] (a) $y = \tan^4(e^x)$

[5] (b) $y = x^4 \tan(e^x)$

[5] (c) $y = \tan(x^4 e^x)$

[5] (d) $f(x) = x^{-7} 7^x \sec(x)$

[5] (e) $f(x) = \frac{\sin(5x)}{\sin(5x) + 1}$

[5] (f) $y = \frac{x \cos(x)}{x^2 - 4}$

[5] 2. Find $\frac{dy}{dx}$ given that $x^3y^3 = 6x + 2y$.

[5] 3. Use the limit definition of the derivative and the identity

$$\sin(a + b) = \sin(a) \cos(b) + \cos(a) \sin(b)$$

to prove that

$$[\sin(x)]' = \cos(x).$$