

1) Differentiate the following functions:

(2 Points Each)

A)  $f(x) = xe^x \csc x$

B)  $y = \frac{\sec x}{1 + \cos x}$

C)  $f(\theta) = \frac{1 + \sin \theta}{\theta + \cos \theta}$

D)  $f(\theta) = \sqrt[3]{1 + \tan \theta}$

2) Prove that  $\frac{d}{dx}(\cot x) = -\csc^2 x$

- 3) Find the equation of the tangent line to the curve  $y = e^x \cos x$  at the point  $(0, 1)$

(2 Points)

- 4) A table of values for  $f$ ,  $g$ ,  $f \circ g$ , and  $g \circ f$  is given:

(2 Points each)

x	f(x)	g(x)	f(g(x))	g(f(x))
1	3	2	4	6
2	1	8	5	7
3	7	2	7	9

- a) If  $F(x) = f(g(x))$ , find  $F'(1)$

- b) If  $G(x) = g(f(x))$ , find  $G'(1)$

- 5) Find the equation of the tangent line to the curve  $\begin{cases} x = 2 \sin 2t \\ y = 2 \sin t \end{cases}$  at the point  $(\sqrt{3}, 1)$

(2 Points)

- 6) Find the equation of the tangent to the circle  $x^2 + y^2 = 25$  at the point  $(3, 4)$ .

(2 Points)