

MATH1010C University Mathematics

Quiz 1

Time allowed: 45 mins

Name: _____ ID: _____ Marks: _____

Answer all questions.

1. Compute the following derivatives or limits: (2 points each)

(a) $\frac{d}{dx} \left(\frac{e^{-x} \sin x}{x^2 + 2x + 2} \right)$

(b) $\frac{d}{dx} \sqrt{x^2 + \ln(1 + \cos^2 x)}$

$$(c) \lim_{x \rightarrow 0} \frac{(2+x)^3 - 8}{x \cos x}$$

$$(d) \lim_{x \rightarrow 0} |x| \cos \left(\frac{e^x}{x + \sin x} \right)$$

2. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined such that

$$f(x) = 2x(x + 1)$$

for all $x \in \mathbb{R}$. Compute $f'(x)$ using the definition of derivatives. (4 points)

3. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined such that

$$f(x) = |x| \sin 2x$$

for all $x \in \mathbb{R}$.

(a) Find $f'(x)$ for $x \neq 0$. (2 points)

(b) Find $f'(0)$. (2 points)

(c) Determine whether $f'(x)$ is continuous at $x = 0$. (2 points)

(d) Determine whether $f'(x)$ is differentiable at $x = 0$. (2 points)