

School of Mathematics and Statistics
Carleton University
Math. 69.104
TEST 2

Print Name : _____

Student Number: _____

PART I: Multiple Choice Questions

50 minutes

Choose and CIRCLE only ONE answer

Non-programmable calculators permitted

One blank sheet for rough work permitted but DO NOT HAND IN.

1. [2 marks] Let $f(x) = \text{Arctan}(2x)$. What is the value of $f'(1)$?

- (a) $\frac{2}{5}$, (b) 2, (c) $\frac{1}{2}$, (d) 0.

2. [2 marks] Evaluate the limit: $\lim_{x \rightarrow 0} \frac{\sin 2x}{\sin 3x}$.

- (a) The limit does not exist, (b) 1, (c) $\frac{2}{3}$, (d) $\frac{3}{2}$.

3. [2 marks] Let $f(x) = \text{Arctan } x + \text{Arccos}(x^2)$. Then $f(1)$ is equal to:

- (a) $\frac{\pi}{2}$, (b) $\frac{\pi}{4}$, (c) 0, (d) $\frac{\pi}{3}$.

4. [2 marks] A function f has the property that $f(1) = 6$ and $f'(1) = 2$. Assuming that f has an inverse function, F , calculate the value of the derivative of F at $x = 6$, that is, $F'(6)$:

- (a) 2, (b) +1, (c) $\frac{1}{2}$, (d) 0.

5. [2 marks] Answer TRUE or FALSE:

The function f defined by $f(x) = \text{Arcsin}(x - 2)$ is differentiable at $x = 2$.

- (a) TRUE, (b) FALSE

PART II: Show all work here.

No additional pages will be accepted

6. [5+5 marks] Find the required limits:

a) $\lim_{x \rightarrow 0^+} \frac{\sin(3x)}{5x}$.

b) $\lim_{x \rightarrow \infty} \sqrt{x}(\sqrt{x+1} - \sqrt{x})$

7. [5+5 marks]

a) $f(x) = \text{Arccos}(\sin(x^3))$. Find $f'(0)$.

b) Calculate the approximate value of the root of the function

$$f(x) = \frac{x}{2} - \sin x$$

near $x_0 = \frac{\pi}{2}$ using the iterations x_0, x_1, x_2 in Newton's method.