FACULTY OF INFORMATION TECHNOLOGY | **MIDTERM EXAM**
Department of Mathematics | **Course name: Calculus 1**
School year 2017-2018 | **Duration 50 minutes**
Date October 17, 2017 | **Exam type: Written**

Code 1

Exercise 1. [1.5 pt] Find a so that the following function is continuous at $x = 2$,

$$f(x) = \begin{cases} \frac{x^2-5x+6}{x-2} & \text{if} \quad x \neq 2 \\ a & \text{if} \quad x = 2 \end{cases}$$

Exercise 2. [1.5 pt] At which point is the function

$$f(x) = \frac{1}{(x+1)^2}$$

discontinuous? Can the discontinuity be removed?

Exercise 3. [1.5 pt] Suppose that the size of population is given by

$$N(t) = \frac{30t}{5+t},\ t \geq 0.$$

Find the growth rate of the population at time $t = 1$.

Exercise 4. Suppose a particle moves along a straight line. The position at time t is given by

$$s(t) = t^3 - t^2 - 2t,\ t \geq 0.$$

a) [1.0 pt] Find the average velocity between $t = 1$ and $t = 3$.

b) [1.0 pt] Find the instantaneous velocity at time $t = 2$.

c) [1.5 pt] When the velocity is zero?

d) [1.0 pt] Examine the monotonicity of $s(t)$.

e) [1.0 pt] When does the particle come back the initial position?

Edited by Quang Sang Phan

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Code 2

Exercise 1. [1.5 pt] Find a so that the following function is continuous at $x = 3$,

$$f(x) = \begin{cases} \frac{x^2-2x-3}{x-3} & \text{if} \quad x \neq 3 \\ a & \text{if} \quad x = 3 \end{cases}$$

Exercise 2. [1.5 pt] At which point is the function

$$f(x) = \frac{1}{(x+2)^2}$$

discontinuous? Can the discontinuity be removed?

Exercise 3. [1.5 pt] Suppose that the size of population is given by

$$N(t) = \frac{40t}{3+t}, \ t \geq 0.$$

Find the growth rate of the population at time $t = 1$.

Exercise 4. Suppose a particle moves along a straight line. The position at time t is given by

$$s(t) = t^3 - 2t^2 - 3t, \ t \geq 0.$$

a) [1.0 pt] Find the average velocity between $t = 1$ and $t = 2$.

b) [1.0 pt] Find the instantaneous velocity at time $t = 3$.

c) [1.5 pt] When the velocity is zero?

d) [1.0 pt] Examine the monotonicity of $s(t)$.

e) [1.0 pt] When does the particle come back the initial position?

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