EASTERN MEDITERRANEAN UNIVERSITY
DEPARTMENT OF MATHEMATICS

Math104 – Mathematics for Business and Economics II

2018 – 2019 Fall Semester
First Midterm Exam

<u>Date</u>: Nov. 21, 2018; <u>Duration</u>: 90 min.;
<u>Note</u>: *Calculator is <u>not</u> allowed*.

Question	Mark
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6.	
7.	
8.	
TOTAL	

Name, surname : ....…………......................……………………......

Student number : ……………...........……... *Group no*: ...…….......…

Department : ………………........... *Signature*: ....………………..

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1. Find the domain of the following functions.

a) $f(x) = \dfrac{1}{3}x^3 - \dfrac{1}{2}x^2 + 3x - 5$ (2 p.)

b) $f(x) = \begin{cases} 2 - x^2, & -1 \le x < 2 \\ e^{-3x}, & 2 \le x < 5 \end{cases}$ (3 p.)

c) $f(x) = \dfrac{\sqrt{2-x}}{x^2 - 4x}$ (5 p.)

2. Evaluate the following limits.

a)
$$\lim_{x \to 4} \frac{x^3 - 16x}{x^2 - 2x - 24}$$
(5 p.)

b) $\lim_{x \to 0} \dfrac{2x^2}{\sqrt{4 + x^2} - 2}$ (5 p.)

3. Given
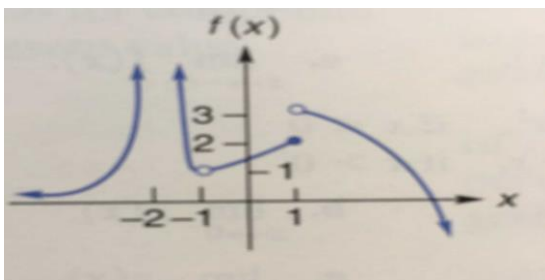
$$f(x) = \begin{cases} x^2, & x < 0 \\ 1, & x = 0 \\ -x, & x > 0 \end{cases}.$$

a) Determine whether $f(x)$ is continuous or not at $x = 0$. Explain. (6 p.)

a) $\lim_{x \to 1^+} f(x) =$ (2 p.)

b) $\lim_{x \to 1^-} f(x) =$ (2 p.)

c) $\lim_{x \to 1} f(x) =$ (2 p.)

d) $f(1) =$ (2 p.)

e) Is $f(x)$ continuous or not at $x = 1$? Explain. (2 p.)

f) $\lim_{x \to -1^+} f(x) =$ (2 p.)

b) $\lim_{x \to -1^-} f(x) =$ (2 p.)

c) $\lim_{x \to -1} f(x) =$ (2 p.)

d) $f(-1) =$ (2 p.)

e) Is $f(x)$ continuous or not at $x = -1$? Explain. (2 p.)

b) Sketch the graph of $f(x)$. (4 p.)

5. Given $y = f(x) = \dfrac{2}{3}x^3 + x^2$.

a) Determine the slope; m_t, of the tangent line to the curve $f(x)$ at $x_0 = -3$. (4 p.)

b) Write the equation of the tangent line to the curve $y = f(x)$, at $x_0 = -3$. (6 p.)

4. Answer the following questions by using the given graph below.

6. Find the derivatives of the following functions.
(*Don't simplify the results*)

a) $y = f(x) = \left(\dfrac{2}{x^2} + e^{-3x} \right)^{\frac{3}{2}}$ (5 p.)

b) $y = f(x) = x^e \ln x$ (5 p.)

c) $y = f(x) = \dfrac{1 + \sqrt{x}}{5 - x^3}$ (5 p.)

d) Given $y = f(u) = \sqrt{2u + 5}$ and $u = g(x) = 3x^2 + 2x$. Use the chain rule to find $\dfrac{dy}{dx}$.   (5 p.)

7. Given $y = f(x) = x^2 - 5x + 4$.

a) Find the x – intercepts.   (2 p.)

b) Find the y intecept.   (1 p.)

c) Find the vertex point.   (4 p.)

d) Check the concavity.   (2 p.)

e) Sketch the graph of $f(x)$.   (6 p.)

8. Given $y = f(x) = 2x^3 - 6x^2 + 5$.

a) Find the critical points of $f(x)$ and determine their nature. (7 p.)

c) Find the inflection point of $f(x)$. Write the concave up and concave down intervals of $f(x)$. (5 p.)

b) Write the increasing and decreasing intervals of f(x). (3 p.)