May, 2019

IŞIK UNIVERSITY, MATH 103 FINAL EXAM

Q1 |		**Student ID:**	**Row No:**
Last Name:		**First Name:**	
I pledge my honour that I have not violated the honour code during this examination.		**Signature :**	

1. (7+6+6+6 pts.) Let
$$f(x) = x^3 + 3x^2 - 4.$$

   i. Find the critical points of f.

   ii. Find the intervals on which f is increasing and the intervals on which f is decreasing.

iii. Find the relative (local) maximum and relative (local) minimum values of f.

iv. Find the intervals on which the graph of f is concave up and the intervals on which the graph of f is concave down. Then determine the point of inflection if exist.

Q2 |	Q3 |	Student ID:	Row No:
Signature		First & Last Name:	

2. (6+6 pts) Consider the function $y = \sqrt{2 - 5x} - 7$.

   i. Find the domain of f.

   ii. Find the inverse function of f on its domain.

3. (13 pts) Find the absolute maximum and the absolute minimum values of $f(x) = 2x^3 - 9x^2 + 1$ on the closed interval [-1,1].

Q4 |	Q5 |	Student ID:	Row No:
Signature		First & Last Name:	

4. (9+8 pts)

i. Find the derivative of the function

$$y = (x-1)e^{x^2+x} + \log_2 x.$$

ii. Find the derivative (y' or $\dfrac{dy}{dx}$) of the function

$$2xy + y^2 = x^3 + y$$

using implicit differentiation.

5. (8 pts) Find the derivative of the following function using logarithmic differentiation.

$$y = \sqrt{\frac{1}{x(x+2)}}$$

Q6 |	Q7 |	Student ID:	Row No:
Signature		First & Last Name:	

6. (12 pts) Find the vertical and horizontal asymptotes of the function

$$f(x) = \frac{-3x^2}{x^2 - 5x + 4}.$$

Explain your reason using limits.

7. (13 pts) Solve the following equation

$$3 - 5\log_{10}(x + 1) = 8$$