



COURSE DETAILS:

Calculus I		MATH 111		MAJOR EXAM II	
Semester:	Fall Semester --Term 191				
Date:	Monday, December 2 nd , 2019				
Time Allowed:	90 minutes				
Instructor:	Dr. Nabil Mlaiki	Dr. Aiman Mukheimer		Prof. Thabet Abdeljawad	Prof. Wasfi Shatanawi
Section Number:	537 (09:00-9:50)	529 (08:00-8:50)	533 (11:00-11:50)	535 (01:00-01:50)	531 (10:00-10:50)

STUDENT DETAILS:

Student Name:			
Student ID:		Attendance Serial Number:	

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities. NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 1	Page 2	Page 3	Page 4	Total	Total
Marks	9	12	10	9	40	20

Q1) (9 points) Differentiate the following functions:

a) $f(x) = \frac{\ln(x^2+1)}{x^2-3}$

b) $f(x) = \csc(11x) \coth(8x)$

c) $f(\theta) = \cot^5(\sin \theta)$

Q2) (6 points) Find the equation of the tangent line to the curve

$y \sin(2x) = x \cos(2y)$, at the point $\left(\frac{\pi}{2}, \frac{\pi}{4}\right)$.

Q3) (6 points) Use logarithmic differentiation to find the derivative of $f(x) = \frac{e^{-x} \cos^2 x}{\tan^{-1} x}$

Q4) (4 points) Each side of a square is increasing at a rate of 6 cm/s . At what rate is the area of the square increasing when the area of the square is 16 cm^2 ?

Q5) (6 points) Evaluate the following limits.

a) $\lim_{x \rightarrow 0} \frac{\sin(3x)}{5x^3 - 4x}$

b) $\lim_{x \rightarrow 0} \frac{\sin(9x) \sin(7x)}{x^2}$

Q6) (5 points) Find the absolute maximum and absolute minimum values of $f(x) = (x^2 - 4)^3$ On the interval $[-2, 3]$.

Q7) (4 points) Show that the equation $x^3 + e^x = 0$ has exactly one real root.