



COURSE DETAILS:

Calculus I		MATH 111		MAJOR EXAM I	
Semester:	Fall Semester --Term 191				
Date:	Wednesday, October 23 rd , 2019				
Time Allowed:	90 minutes				
Instructor:	Dr. Nabil Mlaiki	Dr. Aiman Mukheimer		Prof. Thabet Abdeljawad	Prof. Wasfi Shatanawi
Section Number:		529	533		

STUDENT DETAILS:

Student Name:	
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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	12	20	24	24	80	20

Q1) (12 points; 4 points each) Evaluate the following limits.

a) $\lim_{x \rightarrow +\infty} \frac{x^2 - x - 2}{x^3 + 5}$

b) $\lim_{x \rightarrow 6} \frac{x^2 - x - 30}{x - 6}$

c) $\lim_{x \rightarrow -4} \frac{\sqrt{x^2 + 9} - 5}{x + 4}$

Q2) (8 points) Find a formula of the inverse function of $f(x) = \frac{x+1}{x-2}$

Q3) (12 points; 2 points each) Consider the following graph $y = f(x)$

Find:

a) $\lim_{x \rightarrow 0^-} f(x) =$

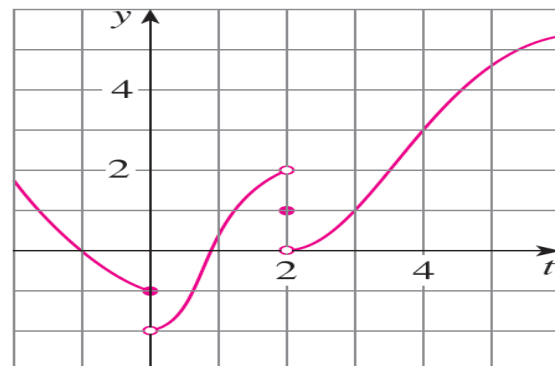
b) $\lim_{x \rightarrow 0} f(x) =$

c) $\lim_{x \rightarrow 2^+} f(x) =$

d) $\lim_{x \rightarrow 2} f(x) =$

e) $f(2) =$

f) $\lim_{x \rightarrow 4} f(x) =$



Q4) (12 points; 4 points each) Let $f(x) = \begin{cases} x^2 + 1 & \text{if } x < 1 \\ (x - 2)^2 & \text{if } x \geq 1 \end{cases}$

1) Find $\lim_{x \rightarrow 1^-} f(x)$ and $\lim_{x \rightarrow 1^+} f(x)$.

2) Does $\lim_{x \rightarrow 1} f(x)$ exist? Give the reason.

3) Sketch the graph of $f(x)$.

Q5) (12 points) Find the values of the constant a that makes $f(x)$ continuous everywhere.

$$f(x) = \begin{cases} ax + 1 & \text{if } x \leq 2 \\ x^2 + 2ax + 7 & \text{if } x > 2 \end{cases}$$

Q6) (12 points) Find the horizontal and vertical asymptotes of the following function:

$$f(x) = \frac{1 + x^4}{x^2 - x^4}$$

Q7) (12 points; 6 points each) Let $f(x) = x^2 - 4x + 2$

a) Use the definition of the derivative to find the slope of the tangent to the curve at $x = 1$

b) Find the equation of the tangent line at the point where $x = 1$.