Prince Sultan University

Deanship of Educational Services

Department of Mathematics
and General Sciences

COURSE DETAILS:

Calculus I	MATH 111	MAJOR EXAM I
Semester:	Fall Semester --Term 181	
Date:	Monday, October 22, 2018	
Time Allowed:	90 minutes	

STUDENT DETAILS:

Student Name:			
Student ID Number:			
Section #:		Attendance Serial #:	
Instructor's Name:			

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
Questions						
Marks	**16**	**17**	**13**	**14**	**60**	**20**

Q1. [3 pts] Find the domain of $f(x)=\dfrac{\sqrt{x+3}}{2-x}$.

Q2. [5 pts] Let $f(x) = \ln(e^{-x} - 4)$

(a) (3 points) Find the domain of $f(x)$.

(b) (2 points) Find the inverse of $f(x)$.

Q3. [4 pts] Find the vertical and horizontal asymptotes of the function: $f(x)=\dfrac{17+x^2}{45x-5x^3}$

Q4. [4 pts] For what value of the constant c is the function f continuous on $(-\infty, \infty)$?

$$f(x)=\begin{cases} cx+7 & \text{for } x\le 2 \\ cx^2-3 & \text{for } x>2 \end{cases}$$

Q5. [17 pts] Find each of the following limits, if it exists:

i. $\lim_{x\to 5}\left(\frac{3x}{x-5}-\frac{15}{x-5}\right)$

ii. $\lim_{x\to 6^-}\frac{x^2-6x}{x^2-12x+36}$

iii. $\lim_{x\to 0}\frac{\sqrt{x+7}-\sqrt{7}}{x}$

iv. $\lim_{x\to -\infty}\frac{\sqrt{9x^2+7}}{2x-9}$

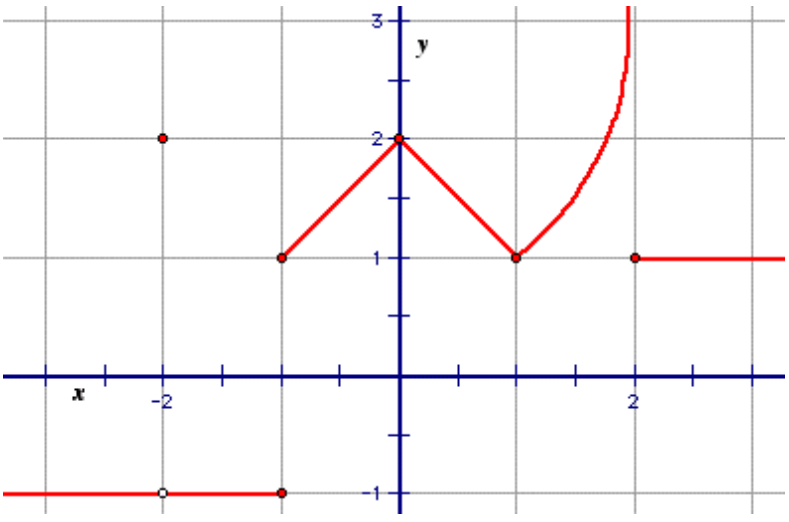
v. $\lim_{x\to 0^+}\frac{1}{2+e^{\frac{1}{x}}}$

vi. $\lim_{x\to 0} x^2 \sin\frac{5}{2x}$

Q6. [4 pts] Let $f(x)=9-5x^2$. Use the definition of the derivative to find $f'(2)$.

Q7. [4 pts] Use the definition of the derivative to show that the function $f(x)=|x-3|$ is not differentiable at $x=3$.

Q8. [5 pts] Let f be the function given by the graph:
Determine the value(s) x **with** the reason for each value where the function is not differentiable



Q9. [4 pts] Find the derivative of each of the following functions:

a. $y = \sqrt{x}\,(x^3 - 14)$

b. $y = \sqrt[3]{x} + \dfrac{2}{\sqrt[4]{x}} - 23e^x$

Q10. [5 pts] Find an equation of the normal line to the curve $f(x) = \dfrac{1-9x^2}{27x^3}$ at $x = \dfrac{1}{3}$.

Q11. [5 pts] For what values x does the graph of $f(x) = \dfrac{x^2}{3x+6}$ have a horizontal tangent?