PRINCE SULTAN UNIVERSITY

MATH 111 CALCULUS

MAJOR EXAM 1 27th October 2010

Start: **4:00 p.m.**
End: **5:30 p.m.**

Name: _____

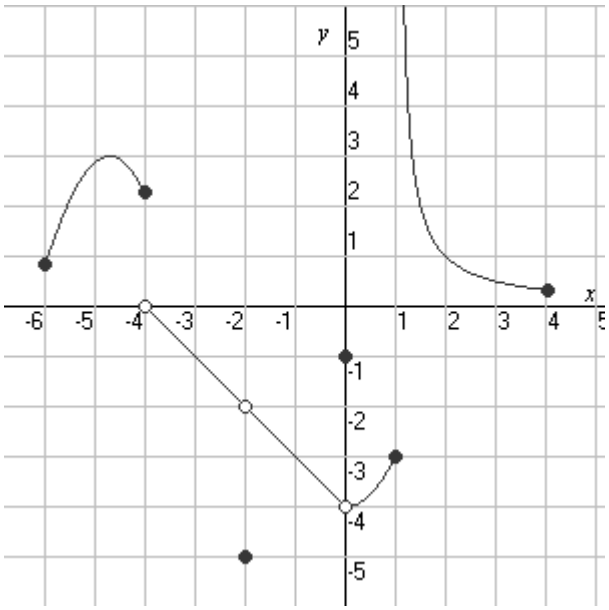
I.D. _____

Instructor: **Dr. Bahaa (Sec. 219)** **Mr. Abid (Sec. 218)**

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 4 Question Sheets with 14 questions.
3. You can use a calculator, **NOT** a mobile phone.
4. No talking during the test.
5. Show all working out in the space provided.

Question No.	Max. Points	Points Scored
1,2	15	
3,4,5,6,7	17	
8,9,10	25	
11,12,13,14	23	
TOTAL SCORE	80	
TOTAL %	100	

1) [11 points] Use the graph to find the following:



a) For what values of x is $f(x)=1$?

b) Find $f(2)$

c) For what values of x is $f(x)\geq 0$

d) Find $f(-2)$?

e) Find $\lim_{x\to -2^+} f(x) =$

f) Find $\lim_{x\to -2^-} f(x) =$

g) Find $\lim_{x\to -2} f(x) =$

h) Is $f(x)$ continuous at $x=-2$? Explain why?

i) Find $\lim_{x\to 1} f(x) =$

2) [4 points] Find the domain of the following functions:

a) $g(x)=\sqrt{2-x}$

b) $G(x)=\dfrac{x+1}{x^3-4x}$

3) [3 points] Given the function $f(x)=\begin{cases}\frac{1}{2x} & x\le 1\\ \sqrt{x}+1 & 1<x<3\\ x^2 & x\ge 3\end{cases}$, find the value of:

a) $f(2)$

b) $f(-2)$

c) $f(3)$

4) [4 points] Sketch the graph of $f(x)=\sqrt{x}$, use this graph to sketch $g(x)=1+\sqrt{x-4}$

5) [3 points] Given $f(x)=x^2+2x$, $g(x)=\frac{1}{\sqrt{x}}$, $h(x)=x+2$, find $(f\circ g\circ h)(x)$.

6) [3 points] Express $f(x)=2|x-3|$ in piecewise form without the absolute value bars.

7) [4 points] Find a general equation (in terms of x and y-intercept b) for the family of lines that are perpendicular to the line $3x+2y-48=0$

8) [6 points] Find the amplitude, period and phase shift of the following function then sketch one period of the graph: $y = -4\cos\left(2x - \frac{\pi}{2}\right)$

9) [4 points] Use a table of at least four values to estimate $\lim_{x\to 3} \frac{x^3 - 3x^2}{2x^2 - 6x}$.

10) [15 points] Find the value of the following:

a) $\lim_{x\to 3^-} \frac{x}{x-3}$

b) $\lim_{x\to -1} \frac{x^2 + x}{x^2 - x - 2}$

c) $\lim_{y\to 2} \frac{y^2 - 4}{y^3 - 8}$

d) $\lim_{y\to 5} \frac{5 - y}{\sqrt{5} - \sqrt{y}}$

e) $\lim_{x\to 4} \frac{\sqrt{x+5} - 3}{x - 4}$

11) [9 points] Find the value of the following limits:

a) $\lim_{x\to-\infty}\left(1+3x^2-5x^3-x^5+27x^4\right)$

b) $\lim_{x\to+\infty}\dfrac{(-2x+4)^3(x-21)}{(3x+15)^2}$

c) $\lim_{x\to-\infty}\dfrac{3x+2}{\sqrt{16x^2-4x}}$

12) [4 points] Find a value for the constant k that will make the following function continuous. $f(x)=\begin{cases}-6kx-9 & , x\le 2\\ 2k^2x & , x>2\end{cases}$

13) [4 points] Find the values of x, if any, at which f is **not** continuous.

$$f(x)=\begin{cases}3x-1 & x\le -1\\ x^2+5x & -1<x<1\\ 3x^3 & x\ge 1\end{cases}$$

14) [6 points] Find the value of the following limits.

a) $\lim_{x\to0}\dfrac{\tan 12x}{\sin 6x}$

b) $\lim_{\theta\to0}\dfrac{\theta^2}{1-\cos\theta}$