PRINCE SULTAN UNIVERSITY

MATH 111 CALCULUS

MAJOR EXAM 1 12th NOVEMBER 2008

Start: **4:00 p.m.**
End: **5:40 p.m.**

Name: _____

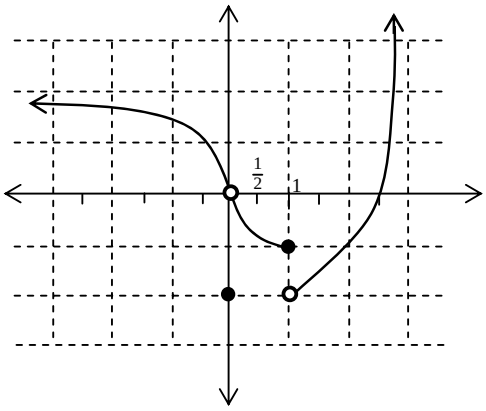
I.D. _____

Instructors Name: _____ **Section:** _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 5 Question Sheets with 13 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	16	
3,4,5,6	20	
7,8,9	31	
10,11	13	
12,13	10	
TOTAL SCORE	90	
TOTAL %	100	

1) [12 points] Use the graph to find the following:



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

b) For what values of x is $f(x) \le 0$?

c) $f(0) =$

d) $\lim_{x \to 0} f(x) =$

e) Is $f(x)$ continuous at $x = 0$? Explain why?

f) $\lim_{x \to 1^-} f(x) =$

g) $\lim_{x \to 1^+} f(x) =$

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

i) $\lim_{x \to 2} f(x) =$

j) $\lim_{x \to -\infty} f(x) =$

k) $\lim_{x \to 3^-} f(x) =$

2) [4 points] Find the domain of $g(x) = \dfrac{\sqrt{2x^2 + x - 15}}{x - 3}$

3) [6 points] Sketch the graph of $f(x) = x^2$, then use this graph and a transformation of it, to sketch $g(x) = x^2 + 4x + 1$. **Show clearly the location of the *x* and *y* intercepts.**

4) [4 points] Express $f(x) = 4|x-4| - 4|x+4|$ in piecewise form without the absolute value bars.

5) [4 points] Find an equation (in terms of *m* the slope and *x*) for the family of lines that pass through the intersection point of $5x - 3y + 11 = 0$ and $2x - 9y + 7 = 0$

6) [6 points] Find the amplitude and period of the following function then sketch one period of the graph: $y = -4\sin(\frac{x}{2} + 2\pi)$

7) [8 points] consider the functions $f(x)=x^2+3$, $g(x)=\sqrt{2x-2}$. Find in simplest form:

a) $(g\circ f)(4)$

b) $(f\circ g)(x)$

c) The domain of $f\circ g$

d) $\dfrac{f(x)-4}{g^2(x)}$

8) [5 points] Use a table of at least four values to estimate the following,

$\lim\limits_{x\to 2}\dfrac{x^3-2x^2}{2x-4}$

9) [18 points] Find the value of the following limits:

a) $\lim\limits_{x\to 2}\dfrac{x^3-x^2+5x}{2x^5}$

b) $\lim\limits_{x\to -2}\dfrac{x^3+8}{x^4-16}$

c) $\lim\limits_{x\to 2^-}\dfrac{x+2}{x-2}$

d) $\lim\limits_{\theta\to 2}\dfrac{2\theta^2-5\theta+2}{5\theta^2-7\theta-6}$

e) $\lim\limits_{x\to 1}\dfrac{x-1}{x^2-2x+1}$

f) $\lim\limits_{y\to 36}\dfrac{36-y}{6-\sqrt{y}}$

10) [4 points] Rationalize the numerator and then find: $\lim_{h\to 0}\dfrac{4-\sqrt{16+h}}{h}$.

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

a) $\lim_{s\to+\infty}\sqrt[3]{\dfrac{3s^7-4s^5}{2s^7+1}}$

b) $\lim_{x\to-\infty}\dfrac{-12x^4+500x^3-x^7+7x-3}{3x^2-12x-10}$

c) $\lim_{t\to+\infty}\dfrac{(t-25)^5}{(-2t^2+4)^4(t+1)^2}$

12) [6 points] Find the value of the following limits:

a) $\lim_{y\to-\infty} \frac{2-y}{\sqrt{7+6y^2}}$

b) $\lim_{x\to+\infty} \sqrt{x^2+mx}-x$

13) [4 points] Find the value of k if possible that will make the function continuous everywhere $f(x)=\begin{cases} x+2k & x\le 1 \\ kx^2+x+1 & x>1 \end{cases}$