

PRINCE SULTAN UNIVERSITY**MATH 111****CALCULUS****MAJOR EXAM 1****26th March 2011****Name:** _____**I.D.** _____**Instructors Name:** _____**Section:** _____

1. Answer all questions
2. This exam consists of 1 Cover Sheet & 5 Question Sheets with 10 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	16	
2,3,4,5,6	20	
7	18	
8	18	
9. 10	8	
TOTAL SCORE	80	
TOTAL %	100	

1) [16 points] Use the graph to find the following:



Question	Answer
a) the domain of f	
b) the range of f	
c) the zeros of f	
d) for what values of x is $f(x) \geq 0$	
e) intervals of which f is increasing	
f) intervals on which f is decreasing	
g) the relative maxima of f	
h) the numbers at which the maximum of f occurs	
i) The value of $f(2)$	
j) $\lim_{x \rightarrow -2^+} f(x) =$	
k) $\lim_{x \rightarrow -2^-} f(x) =$	
l) $\lim_{x \rightarrow -2} f(x) =$	
m) $\lim_{x \rightarrow 1} f(x) =$	

- 2) [4 points] Find the domain of $f(x) = \frac{\sqrt{x-3}}{x^2 - 3x - 10}$
- 3) [4 points] Given the function $f(x) = \begin{cases} \frac{1}{2x} & x < 1 \\ \sqrt{x} + 1 & 1 \leq x < 3 \\ x^3 & x \geq 3 \end{cases}$, find the value of :
- a) $f(1)$
 - b) $\lim_{x \rightarrow 1} f(x)$
 - c) Is the function continuous at $x = 1$? Explain your answer
- 4) [4 points] Sketch the graph of $f(x) = x^3$, use this graph to sketch $g(x) = -(x+2)^3 - 3$
- 5) [4 points] Express $f(x) = -4|x-1| + 2$ in piecewise form without the absolute value bars.
- 6) [4 points] Find a general equation (**in terms of x and slope m**) for the family of lines that passes through the point $(3, 4)$.

7) [18 points] Find the value of the following:

a) $\lim_{x \rightarrow 3} (x^3 - 2x^2 + 4)$

b) $\lim_{x \rightarrow 0} \frac{6x^4 - x}{-x^3 - 2x^2 + 2}$

c) $\lim_{x \rightarrow 3^+} \frac{x}{x - 3}$

d) $\lim_{t \rightarrow 1} \frac{t^3 + t^2 - 5t + 3}{t^3 - 3t + 2}$

e) $\lim_{y \rightarrow 9} \frac{9 - y}{3 - \sqrt{y}}$

f) $\lim_{x \rightarrow 4} \frac{\sqrt{x + 5} - 3}{x - 4}$

8) [18 points] Find the value of the following limits:

a)
$$\lim_{x \rightarrow +\infty} \frac{(-2x+4)^4(-x+7)}{(2x+15)^2}$$

b)
$$\lim_{a \rightarrow -\infty} \frac{1}{a-12}$$

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

d)
$$\lim_{x \rightarrow -\infty} \sqrt[3]{\frac{x^2 - 2x^3}{x^3 - 2x}}$$

e)
$$\lim_{y \rightarrow +\infty} \sqrt{y^2 + 3} - y$$

f)
$$\lim_{x \rightarrow -\infty} \frac{2-x}{\sqrt{3+6x^2}}$$

- 9) [4 points] Sketch a possible graph for a function f with the following properties:
- i) the domain is $[-1, 1]$
 - ii) $f(-1) = f(0) = f(1) = 0$
 - iii) $\lim_{x \rightarrow -1^+} f(x) = \lim_{x \rightarrow 1^-} f(x) = 1$ and $\lim_{x \rightarrow 0} f(x) = 0$
- 10) [4 points] Find a value for the constant k that will make the following function continuous. $f(x) = \begin{cases} 2k^2 + kx & x \leq 2 \\ k^2x + 3x & x > 2 \end{cases}$