

PRINCE SULTAN UNIVERSITY**MATH 111****CALCULUS****MAJOR EXAM 1****22ND MARCH 2008****Start: 4:00 p.m.****End: 5:30 p.m.****Name:** _____**I.D.** _____**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.

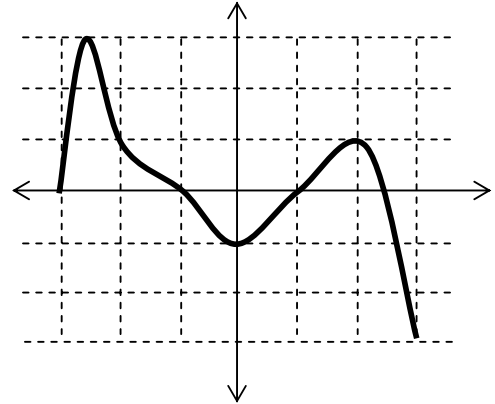
Question No.	Max. Points	Points Scored
1,2,3,4	18	
5,6,7	18	
8,9,10	16	
11,12	24	
13	20	
TOTAL SCORE	96	
TOTAL %	100	

1) [4 points] Use the graph to find the following:

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

b) For what value of y is $x = 3$?

c) For what values of x is $y \leq 0$?



2) [4 points] Find the domain of $g(x) = \frac{\sqrt{x^2 - 4x - 12}}{x - 7}$

3) [4 points] If $f(x) = \begin{cases} -1 & x \leq -5 \\ \sqrt{25 - x^2} & -5 < x < 5 \\ x - 5 & x \geq 5 \end{cases}$, find the value of the following

a) $f(-5.5)$

c) $f(-4)$

b) $f(3)$

d) $f(\sqrt{2})$

4) [6 points] Sketch the graph of $f(x) = \sqrt{x}$, then use this graph to sketch $g(x) = 2\sqrt{(x+4)} - 1$. **Show clearly the location of the x and y intercepts.**

- 5) [6 points] Express $f(x) = 2|x-3| - 3|x+4|$ in piecewise form without the absolute value bars.

- 6) [8 points] Given $f(x) = 2\sqrt{x-1}$ and $g(x) = \sqrt{x-1}$, find the following in the simplest form and **state the domain of each**.

a) $(f+g)(x)$

c) $(fg)(x)$

b) $(f-g)(x)$

d) $\left(\frac{f}{g}\right)(x)$

- 7) [4 points] Given $f(x) = 2x^2 + x$, find the difference quotient $\frac{f(x+h) - f(x)}{h}$ in its **simplest form**.

- 8) [4 points] Given $f(x) = x^2 + 1$, $g(x) = \frac{1}{\sqrt{x+3}}$, $h(x) = x^3 - 1$, find $(f \circ g \circ h)(x)$.

- 9) [5 points] Use a table of values to estimate the following, $\lim_{x \rightarrow 0} \frac{\sqrt{x+1} - 1}{x}$.

- 10) [7 points] Use the graph of the function to answer the following questions:

a) $\lim_{x \rightarrow 1^+} f(x) =$

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

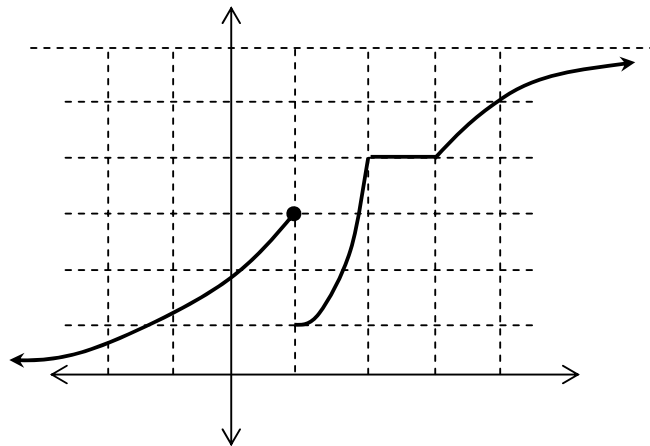
c) $\lim_{x \rightarrow 1} f(x) =$

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

e) $\lim_{x \rightarrow -\infty} f(x) =$

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

g) $f(3) =$



11) [18 points] Find the value of the following limits:

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

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

b) $\lim_{x \rightarrow 1^+} \frac{x^4 - 1}{x - 1}$

e) $\lim_{y \rightarrow 5} \frac{y + 5}{y^2 - 25}$

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

f) $\lim_{y \rightarrow 4} \frac{4 - y}{2 - \sqrt{y}}$

12) [6 points] First rationalize the numerator (multiply by $\frac{\text{conjugate}}{\text{conjugate}}$) and then find:

$$\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}.$$

13) [20 points] Find the value of the following limits:

a) $\lim_{x \rightarrow +\infty} 1 + 2x - 3x^5$

b) $\lim_{x \rightarrow +\infty} \frac{(-3x + 1)^3 (x + 1)}{(2x - 5)^2}$

c) $\lim_{x \rightarrow -\infty} \frac{5x^2 + 7}{3x^2 - x - 1}$

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

e) $\lim_{x \rightarrow +\infty} \sqrt{x^2 + 7x} - x$ (Hint: Multiply by $\frac{\text{conjugate}}{\text{conjugate}}$)