



Prince Sultan University
Orientation Mathematics Program
Math111
Major I

Spring Semester 092
Saturday, March 27, 2010

Time Allowed: 90 minutes

Student Name:

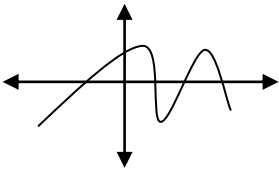
Student ID #:

Important Instructions:

1. You may use a scientific calculator that does not have programming or graphing capabilities.
2. You may **NOT borrow** a calculator from anyone.
3. You may NOT use notes or any textbook.
4. There should be **NO talking** during the examination.
5. Your exam will be taken **immediately** if your mobile phone heard.
6. Looking around or making an attempt to cheat will result in your exam being cancelled.
7. Provide an **organized complete** solution for each Question.
8. This examination has **8 problems**. Make sure your paper has all these problems.

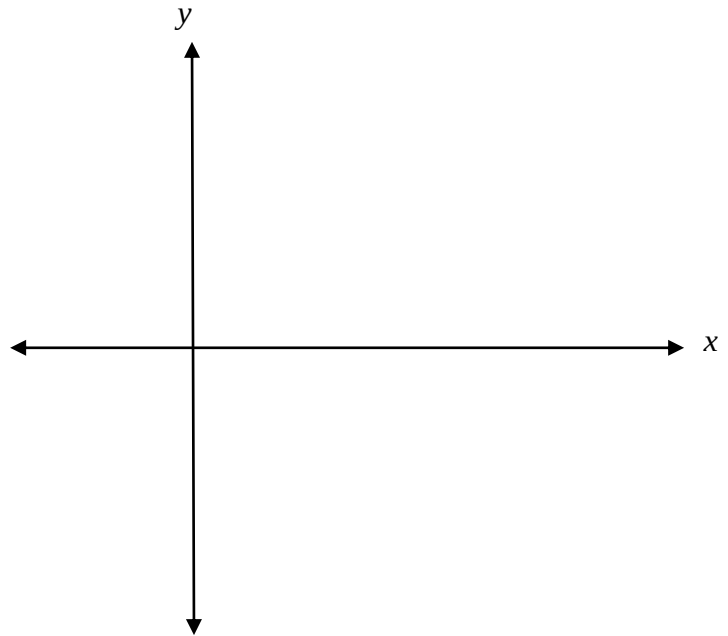
Problems	Max. points	Student's Points
1	30	
2,3	21	
4,5	25	
6,7,8	24	
Total	100	

Q.1 (30 pts) Answer the following quick questions:

	Questions	Answers
1.(3pts)	Let $f(x) = 2x + 1$ and $h(x) = 2x^2 + 4x + 1$. Find a function g such that $(f \circ g)(x) = h(x)$.	
2.(2pts)	Does the graph define a function? 	
3.(3pts)	Classify $f(x) = 2x^3 + x $ as even, odd or neither.	
4.(3pts)	Let $f(x) = 2\sqrt{x-1}$, $g(x) = \sqrt{x-1}$. Find $f - g$.	
5.(4pts)	For $f(x) = -4\sin(\frac{x}{3} + 2\pi)$. Find amplitude and period.	
6.(3pts)	Given that $f(x) = \begin{cases} x+1, & x \leq 1 \\ x-1, & x > 1 \end{cases}$. Find $\lim_{x \rightarrow 1^+} f(x)$.	
7. (2.5pts)	Evaluate $\lim_{x \rightarrow -1} (x^3 + x^2 + x)^{101}$.	
8. (2.5pts)	Evaluate $\lim_{x \rightarrow \infty} (1 + 2x - 3x^5)$.	
9.(4pts)	Suppose that f and g are continuous functions such that $f(2) = 1$ and $\lim_{x \rightarrow 2} [f(x) + 4g(x)] = 13$. Find $g(2)$ and $\lim_{x \rightarrow 2} g(x)$.	
10.(3pts)	Find the discontinuities, if any, of $f(x) = \frac{1}{1 - 2\sin x}$.	

Q.2 (12 pts) Consider the function $f(x) = \frac{1}{(x-4)^3}$.

- a) Determine the domain of f .
- b) Determine the intercepts
- c) Using appropriate translations to Sketch roughly the graph of f .



- d) Write the equations of the vertical and horizontal asymptotes of f .

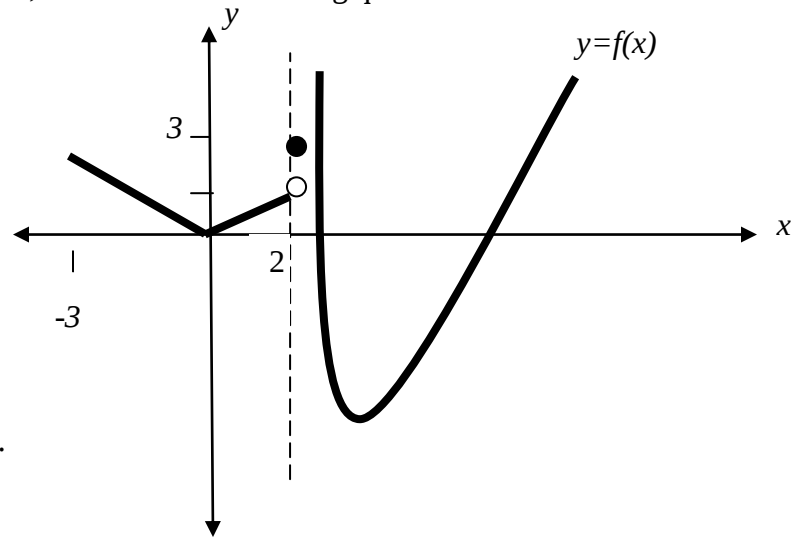
Q.3 (9 pts) Let $f(x) = x^2$ and $g(x) = \sqrt{1-x}$.

- e) State the domain of $f \circ g$.

- f) Find $\frac{f}{g}$.

- g) Find $g(5t+2)$.

Q.4 (17 pts) Use the accompanying graph of f , $x \geq -3$, to answer the following questions:



a) Evaluate $\lim_{x \rightarrow 2^-} f(x)$.

b) Evaluate $\lim_{x \rightarrow 2} f(x)$.

c) Is f continuous at $x = 2$. Justify your answer.

d) Evaluate $\lim_{x \rightarrow \infty} f(x)$.

e) Where does x approach as $f(x) \rightarrow \infty$.

f) Find $f(2)$.

Q.5 (8 pts) Evaluate the limits:

a) $\lim_{x \rightarrow 3} \frac{x}{x-3}$.

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

Q.6 (12 pts) Find the limits:

a) $\lim_{x \rightarrow \infty} \frac{7 - 6x^5}{x^2 + 3}.$

b) $\lim_{x \rightarrow 6} \frac{y + 6}{y^2 - 36}.$

c) $\lim_{x \rightarrow 0} \frac{\sin 6x}{\sin 8x}.$

Q.7 (7 pts) Find the value of the constant k , if possible, that makes the function $f(x) = \begin{cases} kx^2, & x \leq 2 \\ 2x + k, & x > 2 \end{cases}$ continuous everywhere.

Q.8 (5 pts) Use the Squeezing Theorem to evaluate that $\lim_{x \rightarrow 0} x \cos\left(\frac{1}{x}\right).$

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