SULTAN QABOOS UNIVERSITY
DEPARTMENT OF MATHEMATICS AND STATISTICS
9 October 2007

MATH 2107 CALCULUS I

TEST I VERSION II

(Time allowed: 60 minutes)

NAME:_____**ID#:**_____ **Section:**_____

Instructions:

- This test contains 6 pages (3 sheets back to back) and 12 questions. **The empty extra sheet is for rough work and will not be marked**.
- Write your name, ID number and Section number in the first page and ID number at the top of each sheet.
- Attempt all questions, writing your answer in the space below the statement of the question. For questions 1-6 show all your work.
- For **Multiple Choice** questions, **CIRCLE the correct answer**.
- Please do NOT SEPARATE the pages of this booklet.

DO NOT WRITE ON THIS BOX!

Problem	points	score
1	4 pts	
2	5 pts	
3	4 pts	
4	7 pts	
5	4 pts	
6	4 pts	
7-12	12 pts	
TOTAL	40 pts	

1. (4 points) Find $\lim_{x\to 1^+} \sqrt{\dfrac{x^3-x}{x^4-1}}$

2. Let $f(x) = \begin{cases} 2x+8, & x \leq 1 \\ 3x+7, & x > 1. \end{cases}$

(a) (2 points) Show that f is continuous.

(b) (3 points) Show that f is not differentiable at $x = 1$.

3. (4 points) Find the x-coordinates of the points on the graph of $y = x^3$ where the tangent line is parallel to the secant line that cuts the curve at $x = -1$ and $x = 1$.

4. (a)(4 points) Let $y = (x^2 + 5)^{\ln x}$. Find $\dfrac{dy}{dx}$.

(b) (3 points) Given that $f(x) = \cos 5x - \cos 7x - x - 1$. Find $f''(0)$.

5. (4 points) Use an appropriate local linear approximation to estimate the value of $\sin(46°)$.

6. Let $f(x) = \ln(e^x + 1)$.
(a) (2 points) Find a formula for $f^{-1}(x)$.

(b)(2 points) Find the derivative of the inverse function f^{-1}.

The remainder of this exam consists of **Multiple Choice** questions. Circle the correct answer for each question. **No partial credit will be given.** (2 points each)

7. $\lim_{x\to+\infty} \dfrac{7x^5 - 2\sqrt{x} + 1}{3x^5 - \sqrt[3]{x} + 2} =$

(A) 0 **(B)** $+\infty$ **(C)** $\dfrac{7}{3}$ **(D)** 7 **(E)** None of the above

8. If $f(x) = \pi^5$, then $f'(x) =$

(A) 1 **(B)** $5x^4$ **(C)** 0 **(D)** $5\pi^4$ **(E)** None of the above

9. The equation $12x^4 + 26x^2 + 11x^3 + 22x + 4 = 0$ has at least one solution in the interval

(A) $[1, 2]$ **(B)** $[-5, -2]$ **(C)** $[0, 2]$ **(D)** $[-\dfrac{1}{2}, 0]$ **(E)** $[0, 1]$

10. $\lim_{h\to 0} \dfrac{\log_2(x+1+h) - \log_2(x+1)}{h} =$

(A) $\dfrac{\ln 2}{x} + 1$ **(B)** $\dfrac{2^x}{x+1}$ **(C)** $\dfrac{1}{x+1}$ **(D)** $\dfrac{1}{(x+1)\ln 2}$ **(E)** $\dfrac{\ln 2}{x+1}$

11. Given that $\dfrac{d}{dx}[f(x^2)] = 2x^2$ for $x \neq 0$. Then $f'(x^2) =$

(A) $f(2x)$ **(B)** x **(C)** $2xf(x^2)$ **(D)** $2x$ **(E)** None of the above

12. $\lim_{x\to 0} \dfrac{\cos(x) - 1}{x} =$

(A) does not exist **(B)** -1 **(C)** 1 **(D)** 0 **(E)** undefined

THE END OF THE TEST