Prince Sultan University

Department of Mathematical Sciences

Major III Exam

Semester II, 2010 SPRING (092)

29th May, 2010

MATH 113 – CALCULUS II

Time Allowed : 90 minutes $\left(1\frac{1}{2} \text{ hours}\right)$

Maximum Points: 100 points

Mr. Khaled Naseralla

Name of the student: _____

ID number : _____

Section : **219**

For All The Students:

- **Answer all the questions.**
- **This exam consists of *5 questions and a total of 7 pages.***
- **Show your working for each question with all the key steps.**
- **Only scientific, non-programmable calculators are allowed.**

Questions	*Maximum Score*	*Your Score*
Q.1	55	
Q.2	12	
Q.3	18	
Q.4	10	
Q.5	5	
Total	**100**	

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***Q.1 (55 points)*: Evaluate the following integrals:**

a) $\int \sin^5(6x)dx$

b) $\int \frac{7x}{x^2\sqrt{x^2-1}}dx$

c) $\int e^{8x}\cos x dx$

d) $\int 4\tan^{-3} x \sec^4 x dx$

e) $\int (9x^2 - 7x)e^{2x} dx$

f) $\int \frac{dx}{\sqrt{x^2 - 6x + 10}}$

g) $\int_4^5 \frac{\ln 3x^5}{x^2} dx$

h) $\int \frac{\sinh(x^{-\frac{1}{2}})}{x^{\frac{3}{2}}} dx$

i) $\int_1^2 \frac{1}{\sqrt{x}\left(\sqrt{1-x}\right)} dx$

Q.2 (12 points): **Evaluate the following integral using *two different methods.***

$$\int_0^2 \frac{5dt}{8+2t^2}$$

Q.3 (18 points): **Evaluate the given limits.**

a) $\lim_{x\to 0^+} \dfrac{\ln(\sin x)}{\ln(\tan x)}$

b) $\lim_{x\to 1}\left(\dfrac{x}{x-1}-\dfrac{1}{\ln x}\right)$

c) $\lim_{x\to 0^+}(2x)^{x^2}$

Q.4 (10 points): **Find** $\frac{dy}{dx}$ **. (Simplify)**

(i) $y = 4\cosh^2(\ln x^2)$

(ii) $y = \sinh^{-1}(\tanh x)$

Q.5 (5 points): **Prove the identity** $\tanh(\ln x) = \frac{x^2 - 1}{x^2 + 1}$