Prince Sultan University

Department of Mathematical Sciences

Final Exam

Semester II, 2010 SPRING (092)

Sunday - June 20, 2010

MATH 113 – CALCULUS II

Mr. Khaled Naseralla

Time Allowed : 150 minutes $\left(2\frac{1}{2} \text{ hours}\right)$

Maximum Points: 100 points

Name of the student: _____

Student ID number : _____

Section : **219**

Questions	*Maximum Score*	*Your Score*
Q.1	37	
Q.2 , Q.3	16	
Q.4 , Q.5	14	
Q.6 , Q.7 , Q.8	17	
Q.9 , Q.10	16	
Total	**100**	

40

For All The Students:

- Answer all the questions.
- This exam consists of *10 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.
- There should be no talking during the examination.

***Q.1 (37 points)*:** Evaluate the following integrals:

a) $\int \frac{2x+5}{x^2-3x+2}dx$

b) $\int \frac{2}{x^2\sqrt{4+x^2}}dx$

c) $\int x\sin(3x)dx$

d) $\int \sqrt{\sin x}\cos^3 x\,dx$

e) $\int \frac{3}{x^3+3x}dx$

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

Q.2 (10 points): Evaluate the integral and determine whether it ***converges or diverges.***

(i) $\int_{-2}^{+\infty} e^{-x}\,dx$

(ii) $\int_{2}^{+\infty} \frac{1}{(x-2)^2}\,dx$

Q.3 (6 points): (i) Use Simpson's Rule to approximate the integral with $n = 4$ subintervals.

(ii) Use your calculator to evaluate the exact value of $\int_{0}^{2} e^{-x^2}\,dx$

(iii) Calculate the absolute error.

Round your answers to 4 decimal places

Q.4 (6 points): (i) Use $n = 6$ subintervals to approximate the integral $\int_0^{0.6} \frac{1}{\sqrt{4-x^2}} dx$ by the Trapezoid approximation.

(ii) Use your calculator to evaluate the exact value of $\int_0^{0.6} \frac{1}{\sqrt{4-x^2}} dx$

(iii) Calculate the absolute error.

Round your answers to 4 decimal places

Q.5 (8 points): Find the following limits:

(i) $\lim_{x \to \frac{\pi}{2}} (2x - \pi) \sec x$

(ii) $\lim_{x \to 0} \frac{e^x + e^{-x} - 2}{1 - \cos 2x}$

***Q.6 (5 points)*:** Find the area of the region enclosed by the curves $y = -2x$ and $y = x^2 - 3$

***Q.7 (6 points)*:** Find the volume of the solid generated when the region bounded by $x + y - 2 = 0$, $y = x$ and $x = 0$ is revolved about the line $x = -2$.

***Q.8 (6 points)*:** Find the total distance traveled by a particle moving with a velocity $v(t) = t^2 - 2t$ during the time interval $0 \le t \le 4$

Q.9 (5 points): Compute the following sum without using a calculator.

$$\sum_{i=1}^{20}\left(\frac{i}{20}\right)^2$$

Q.10 (11 points): Solve the following Differential Equations:

(i) $\dfrac{\sqrt{1+2x^3}}{2+y}\dfrac{dy}{dx} = -5x^2 \qquad ; \qquad y(0) = -1$

(ii) $\dfrac{1}{2}y' + y = \sin(e^{2x})$