Prince Sultan University

Department o f Mathematical Sciences

Major II Exam

Semester I, 2009 FALL (091)

December 14, 2009

MATH 113 – CALCULUS II

Time Allowed : 90 minutes
Maximum Points : 60 points

Name of the student: _____

ID number : _____

Section : 221

For All The Students:

- **Answer all the questions.**
- **This exam consists of *a total of 6 pages and 8 questions.***
- **Show your working in the space provided for each question.**
- **Show all the key steps of your work.**
- **Scientific, non-programmable calculators are allowed.**

Question	Maximum score	*Your Score*
Q.1	15	
Q.2 , Q.3	12	
Q.4 , Q.5	12	
Q.6	10	
Q.7 , Q8	11	
Total	**60**	

Q.1 (15 points): Evaluate the following integrals:

a) $\int_0^1 \frac{dx}{\sqrt{e^x}}$

b) $\int \frac{\cos\left(\ln x^4\right)}{x} dx$

c) $\int_1^{e^{\frac{\pi}{4}}} \frac{\sec^2(\ln x)}{x} dx$

d) $\int x\, 2^{x^2} dx$

e) $\int_0^1 \frac{e^x - 1}{e^{2x}} dx$

Q.2 (6 points): Find the area of the region enclosed by the graphs of $x + y = 2$ and $x = y^2$.

Q.3 (6 points): Find the exact length of the arc of $y = 4x^{\frac{3}{2}} + 1 \quad ; \quad 1 \le x \le 2$

Q.4 (6 points): Find the area of the surface generated when $y = \sqrt{4 - x^2}$ from $x = 0$ to $x = 1$ is revolved about $x - axis$

Q.5 (6 points): Use *the washers method* to find the volume of the solid generated by revolving the region bounded by the graphs of $y = \sqrt{2 - x}$ and $y = -x$ and $y = 0$ about $y - axis$

Q6 (10 points): Use the best method to find the volume of the solid generated when the region bounded by $y = 4 - x$, $y = x$, and $y = 4$ is revolved about:

a) $x - axis$ b) $y - axis$

Q.7 (6 points): Use *the cylindrical shell method* to find the volume of the solid that results when the region enclosed by $x = y^2$, $x = y$ is revolved about the line $x = -1$

Q.8 (5 points): Let V be the volume of solid that results when the region enclosed by $y = \frac{1}{x}$, $y = 0$, $x = 2$, and $x = b\ (0 < b < 2)$ is revolved about the $x-axis$.

Find the value of b for which $V = 3$