Prince Sultan University

Math 113
Major Exam 2
Second Semester, Term 122
Wednesday, April 17, 2013

Time Allowed: 75 minutes

Student Name:_____   _____   _____

Student ID #: _____

Serial Class #:_____   Section #:   227 or 228

Instructor's Name: Dr. Aiman Mukheimer

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. Talking during the examination is NOT allowed.
5. Your exam will be taken immediately if your mobile phone is seen or heard.
6. Looking around or making an attempt to cheat will result in your exam being cancelled.
7. This examination has 7 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1	20	
2	20	
3,4	20	
5	20	
6,7	20	
Total	100	

1. (20 points) Evaluate the following integrals: **(Show your work in details)**

   i. $\displaystyle\int_0^1 x\sqrt{2-\sqrt{1-x^2}}\,dx$

   ii. $\displaystyle\int_0^{\sqrt{2}/2} \frac{x^2}{\sqrt{1-x^2}}\,dx$

   iii. $\displaystyle\int \frac{1}{1+2e^x - e^{-x}}\,dx$

2. (20 points) Evaluate the following integrals: **(Show your work in details)**

i. $\int \dfrac{\sin^3(\sqrt{x})}{\sqrt{x}}\,dx$

ii. $\int \sqrt{x^2 + 2x}\,dx$

3. (10 points) Evaluate the following integral: **(Show your work in details)**

$$\int_0^1 \frac{x^3 - 4x - 10}{x^2 - x - 6} dx$$

4. (10 point) Use a comparison test to determine whether the integral $\int_0^\infty \frac{3}{x + e^x} dx$ is convergent or divergent.

5. (20 point) Determine whether the integral converges or diverges. Find the value of the integral if it converges:

i. $\displaystyle\int_0^1 \frac{\ln x}{\sqrt{x}}\,dx$

ii. $\displaystyle\int_{-\infty}^{\infty} \frac{x^2}{9+x^6}\,dx$

6. (10 point) Find the length of the arc of $f(y) = \dfrac{1}{3}\sqrt{y}\,(y-3)$, $1 \le y \le 9$.

7. (10 points) Find the area of the surface generated by rotating the curve $y = \sqrt{1+e^x}$, $0 \le x \le 1$ about the x-axis.