Prince Sultan University

Department of Mathematics and Physical Sciences

Math 113
Second Midterm Exam
Semester I, Term 131
Monday, December 12, 2013

Time Allowed: 90 minutes

Name:

Student Number:

Instructor's Name: Nabil Mlaiki, Jehad Alzabut

Statement of Ethics:

I agree to complete this exam without unauthorized assistance from any person, materials, or device.

Signature:

Total/80:

Total/20:

Problem 1. (6+7+8 points) Evaluate the following integrals:

a. $\int_0^{\pi/2} \cos^5 x\,dx$

b. $\int_{\pi/6}^{\pi/3} \frac{\sin\theta\cot\theta}{\sec\theta}\,d\theta$

c. $\int \frac{1}{x^2\sqrt{x^2-16}}\,dx$

Problem 2. (12+9 points)

a. Write down the partial fraction decomposition of the function $\frac{10}{(x^2+9)(x-1)}$. Evaluate the integral $\int \frac{10}{(x^2+9)(x-1)}\,dx$.

b. Find the exact area of the surface obtained by rotating the curve $y=\sqrt{1+e^x}, 0 \le x \le 1$ about the x-axis.

Problem 3. (8+8 points)

a. Determine whether the integral $\int_1^{\infty} \frac{e^{-\sqrt{x}}}{\sqrt{x}} dx$ is convergent or divergent. If it converges evaluate the integral.

b. Use the Comparison Theorem to determine whether the integral $\int_1^{\infty} \frac{2+e^{-x}}{x}$ is convergent or divergent.

Problem 4. (7+7+8 points)

a. Determine whether the sequence $a_n = \dfrac{\cos^2(n)}{2^n}$ converges or diverges. If it converges find the limit.

b. Determine whether the series converges or diverges. If it converges find the limit.

i. $\displaystyle\sum_{n=0}^{\infty} \frac{\pi^n}{3^{n+1}}$

ii. $\displaystyle\sum_{n=1}^{\infty} \left(e^{1/n} - e^{1/n+1} \right)$