Prince Sultan University

Math 113
Major Exam 3
First Semester, Term 121
Tuesday, December 18, 2012

Time Allowed: 90 minutes

Student Name: _____

Student ID #: _____

Section Number: _____

Instructor's Name: _____

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 6 problems, some with several parts. Make sure your paper has all these problems.

Problems	Max points	Student's Points
1,2	10	
3	12	
4	10	
5	8	
6	10	
Total	50	

1. (4 points) Determine whether the sequence $a_n = \left\{ \frac{(9)^n}{n!} \right\}_{n=1}^{\infty}$ converges or diverges. If it converges, find its limit.

2. (6 points) Determine whether the series: $\frac{1}{(1)\cdot(2)} + \frac{1}{(2)\cdot(3)} + \frac{1}{(3)\cdot(4)} + \frac{1}{(4)\cdot(5)} + \cdots\cdots$ converges or diverges, if it's converge find the sum.

3. (12 points) Determine whether the following series converges or diverges. **Justify your answers in details.**

a) $\sum_{n=1}^{\infty} 2^{2k} \cdot 3^{2-3k}$

b) $\sum_{n=1}^{\infty} \frac{9}{3n^2 + 8n + 7}$

c) $\sum_{k=4}^{\infty} \frac{e}{k-3}$

4. (10 points) Determine whether the following series converges or diverges. **Justify your answers in details.**

a) $\sum_{n=3}^{\infty} \frac{1}{n\,(\ln n)^2}$

b) $\sum_{k=7}^{\infty} \frac{\sqrt{k+4}}{\sqrt{k^5+7k}}$

5. (8 points) Determine whether the following series absolutely convergent, conditionally convergent or divergent. **Justify your answers in details.**

a) $\sum_{k=1}^{\infty}(-1)^{k+1}\frac{3}{e^{1/k}}$

b) $\sum_{k=2}^{\infty}\frac{e^k}{(2+\frac{1}{k})^k}$

6. (10 points) Determine whether the following series absolutely convergent, conditionally convergent or divergent. **Justify your answers in details.**

a) $\sum_{n=1}^{\infty} (-1)^{n+5} \frac{(4)^n}{(2n+1)!}$

b) $\sum_{n=1}^{\infty} \frac{\sin(4\pi/3)}{n!}$