

Due Date: July 21, 2011 Thursday

NAME:.....

Ali Sinan Sertöz

STUDENT NO:.....

**Math 302 Complex Analysis II – Homework 8 – Last One**

1	2	TOTAL
10	10	20

*Please do not write anything inside the above boxes!*

Check that there are 2 questions on your booklet. Write your name on top of every page. Show your work in reasonable detail. **A correct answer without proper or with too much reasoning may not get any credit.**

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**Q-1)** While trying to extend the Gamma function to the whole plane we made use of the following function

$$f(z) = \frac{1}{z} - \frac{1}{(z+1)} + \frac{1}{2!(z+2)} - \cdots + \frac{(-1)^n}{n!(z+n)} + \cdots .$$

We claimed that “ $f(z)$  is an analytic function for all  $z \in \mathbb{C}$  except when  $z = 0, -1, -2, \dots$ ”

Prove this claim.

**Solution:**

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**Q-2)** Prove that  $\sum_{\substack{p: \text{ prime} \\ n \geq 2}} \frac{1}{np^{nz}}$  is analytic in  $\text{Re } z > \frac{1}{2}$ .

Show your work in detail, explain all your arguments.

**Solution:**