Due Date: 10 February 2015, Tuesday
Time: Class time
Instructor: Ali Sinan Sertöz

NAME:...

STUDENT NO:.......................................

Math 430 / Math 505 Introduction to Complex Geometry – Homework 1

1	2	3	4	5	TOTAL
20	40	40	0	0	100

Please do not write anything inside the above boxes!

Check that there are **3** questions on your exam booklet. Write your name on top of every page. Show your work in reasonable detail. A correct answer without proper or too much reasoning may not get any credit. **Submit your solutions on this booklet only. Use extra pages if necessary.**

Rules for Homework and Take-Home Exams

(1) You may discuss the problems only with your classmates or with me. In particular you may not ask your assigned questions or any related question to online forums.

(2) You may use any written source be it printed or online. Google search is perfectly acceptable.

(3) It is absolutely mandatory that you write your answers alone. Any similarity with your written words with any other solution or any other source that I happen to know is a direct violation of honesty.

(4) You must obey the usual rues of attribution: all sources you use must be explicitly cited in such a manner that the source is easily retrieved with your citation. This includes any ideas you borrowed from your friends.

(5) Even if you find a solution online, you must rewrite it in your own narration, fill in the blanks if any, making sure that you exhibit your total understanding of the ideas involved.

(6) If I sense any hint of violation of any of the above rules in your paper I will either assume that you did not answer that question or that your contribution is only on the level of a scribe in which case I will assign a small fraction of the grade for that question.

Affidavit of compliance with the above rules: I affirm that I have complied with the above rules in preparing this submitted work. Moreover I declare that every solution I wrote reflects my true understanding of the problem and any sources used, ideas from friends or other sources included, are explicitly cited without exception. I am aware that violation of the above codes results not only in losing some meaningless grades but also of respect and dignity.

Please sign here:

NAME: STUDENT NO:

Q-1) Let $\epsilon = (\epsilon_1, \epsilon_2)$ with $\epsilon_1, \epsilon_2 > 0$. Let $B_\epsilon(0)$ be the polydisc around the origin defined by

$$B_\epsilon(0) = \{(z_1, z_2) \in \mathbb{C}^2 \mid |z_1| < \epsilon_1 \quad \text{and} \quad |z_2| < \epsilon_2\}.$$

(a) Describe the set $\partial B_\epsilon(0)$, the boundary of the polydisc $B_\epsilon(0)$, in a similar way as the above description of the polydisc itself.

(b) Let $\delta = (\delta_1, \delta_2)$ with $\delta_1, \delta_2 > 0$. Let $(a, b) \in \partial B_\epsilon(0)$. Show that the polydisc $B_\delta(a, b)$ around (a, b) contains both a point in $B_\epsilon(0)$ and a point in the complement of $B_\epsilon(0)$ by explicitly writing two such points.

Solution:

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Q-2) Let U be a non-empty open subset in $\mathbb{C}^n$ where $n > 1$, and let $f : U \to \mathbb{C}$ be a non-constant holomorphic function. Show that $f(U)$ is open in $\mathbb{C}$. You may use the fact that the statement is true when $n = 1$.

Solution:

NAME: STUDENT NO:

Q-3) Let U be a non-empty open subset in $\mathbb{C}^n$ where $n > 1$, and let $f : U \to \mathbb{C}$ be a non-constant holomorphic function. Show that there is no point $z_0 \in U$ such that $|f(z_0)| \geq |f(z)|$ for all $z \in U$. You may use the fact that the statement is true when $n = 1$.

Solution: