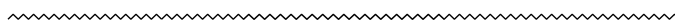


## Submission of Corrections Guidelines

1. You may submit corrections to me for problems 4 or 5 which you wish to have graded for additional credit.
2. The corrections should be submitted on separate paper.
3. If you submit corrections for any problem, then the corrections must work the entire problem from the makeup exam.
4. The corrections are worth up to two-thirds of the missed credit.
5. The corrections are due back to me by **Wednesday, 23 April** (in class).
6. You do not need to return the original exam to me.



Math 5321

Exam II  
Make-up

16 Apr 2014

Answer the problems on separate paper. You do not need to rewrite the problem statements on your answer sheets. Work carefully. Do your own work. **Show all relevant supporting steps!**

Notation: Let  $G$  be a region in  $\mathbb{C}$ . Then,  $\mathcal{A}(G) = \{f : f \text{ is analytic on } G\}$ .

1. N/A
2. N/A
3. N/A

4. (20 pts) Find the number of zeros of  $p(z) = z^5 - 20z^4 + 5z^3 - z^2 + 50z - 17$  in the annulus  $ann(0;1,5)$

5. (20 pts) Let  $D = \{z : |z| < 1\}$  and let  $H = \mathbb{C} \setminus (-\infty, 0]$ . Let  $F = \{f \in \mathcal{A}(D) : f(D) \subset H, f(0) = 1\}$ . Prove that  $\max_{f \in F} |f'(0)| \leq 4$