Math 351

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Fall 2009

Name: . . . .

Student ID (last 6 digits): XXX- . . . .

Take Home Exam 1

You must turn in this exam in class on Monday, October 5th. Since this is a take home, I want all your solutions to be neat and well written.

Do all work on this exam, i.e., on the page of the respective assignment. Indicate clearly, when you continue your solution on the back of the page or another part of the exam.

Write your name and the last six digits of your student ID number on the top of this page. Check that no pages of your exam are missing. This exam has 3 questions and 4 printed pages (including this one).

You can look at your notes and at our book, but you cannot look at any other references (including the Internet) and you cannot discuss this with *anyone*!

Good luck!

Question	Max. Points	Score
1	16	
2	17	
3	17	
Total	50	

1) [16 points] Let $a, b \in \mathbb{Z}$. Prove that $(a, b) = (a, a + b)$.

2) [17 points] Show that for any positive integer n, the number $n^2 + 3n + 2$ is never prime.
[**Hint:** If it is not prime, then it factors!]

3) [17 points] Prove that if n and is composite and not a perfect square, then $(n-1)! \equiv 0$ (mod n). [**Hint:** If it is composite, then it factors! Then use the fact it is not a perfect square.]