Math 236, additional problems for Homework #9

These problems are due, along with the rest of Homework #9, at the beginning of class on Friday, February 28.

A1. Find a rule, similar to those we found in class, for testing a positive integer for divisibility by 11. Why is the rule relatively simple? Use your rule to show that 2376 and 402314 are both divisible by 11.

A2. Find a rule, similar to those we found in class, for testing a positive integer for divisibility by 37. Why is the rule relatively simple? Use your rule to show that 15022 and 11000174 are both divisible by 37.

A3. Here is a rule for checking divisibility by 7 that is different from the kinds of rules we discussed in class: Remove the last digit, double it, and subtract it from the truncated original number. The result is divisible by 7 if and only if the original number was. (As with all the rules, you can use this repeatedly to reduce the problem to one that is tractable.) Use this procedure to show that 154154 is divisible by 7. Then prove that this method indeed works for any number.