Theory of Functions of a Complex Variable I

Here (in alphabetical order) is the list compiled in class of eleven theorems from the semester.

1. Cauchy's integral formula
2. Cauchy's theorem
3. Identity theorem
4. Laurent series, existence and uniqueness
5. Liouville's theorem
6. Maximum principle
7. Morera's theorem
8. Open mapping theorem
9. Residue theorem
10. Rouché's theorem
11. Schwarz lemma

Part A

State six of these theorems, including at least three corresponding to prime numbers.

Part B

Prove four of the theorems, including at least one corresponding to a perfect square.

Remarks

The theorems that you choose for Part B may be, but are not required to be, a subset of your theorems from Part A.

In the case of a theorem that has more than one version, you may (both in Part A and in Part B) choose whichever version you wish.

Optional bonus question for extra credit

Two weeks from today (December 29) is the 149th anniversary of the birth of algebraist Kurt Hensel, inventor of the p-adic numbers. The great number theorist and analyst Peter Dirichlet was married to Hensel's great-aunt, and her cousin was married to Ernst Kummer, who is responsible for the word "ideal" in algebra. Kummer's son-in-law (who was also Kummer's student) made an appearance in this course. What is his name?