Midterm 2 study guide

Things you should know:

1. State equivalent statements of the meaning of continuous function.
2. Explain how if f is a continuous function and U is an open set, then $f^{-1}(U)$ is open.
3. Show using sequences that if K is closed and f is continuous then $f^{-1}(K)$ is closed.
4. Definition of (sequentially) compact sets.
5. Prove that a compact set is closed and bounded.
6. Prove that if K is a compact set and f is continuous, then $f(K)$ is a compact set.
7. Prove that if K is compact and F is closed then $K \cap F$ is compact.
8. Test if a polynomial is analytic.
9. Find the imaginary part of an analytic polynomial whose real part you know, and vice versa, and write as a polynomial in z.
10. Definition of radius of convergence for a power series.
11. Prove the "uniqueness theorem" (2.12).
12. Definition of complex-differentiable function.
13. Prove that a complex-differentiable function must satisfy the Cauchy-Riemann equations.
14. State the converse: When does satisfiability of the Cauchy-Riemann equations imply the function is complex differentiable?
15. Sketch the proof of the previous part.
16. Work with the Cauchy-Riemann equations to determine if a given real/imaginary part can be extended to an analytic function.
17. Definition and main properties of e^z.