Assignment 6

The state of mind which enables a man to do work of this kind ... is akin to that of the religious worshipper or the lover; the daily effort comes from no deliberate intention or program, but straight from the heart.
- Albert Einstein

1. (Tuesday workshop) Prove the geometric series formula $1 + x + x^2 + x^3 + \cdots = \frac{1}{1-x}$. There are many nice arguments for this fact, including some very clever algebraic tricks, and beautiful visual proofs with certain values of $x$. Write up your favorite proof.

2. (Tuesday workshop) Reprove the result of problem 1 in the following way: show that the partial sum $1 + x + x^2 + \cdots + x^n = \frac{1-x^{n+1}}{1-x}$. For which values of $x$ does this converge as $n \to \infty$, and for which values of $x$ does it diverge? In the cases where it does converge, prove convergence by an $\epsilon$ argument.

3. Section 13.3, problems 2b, 2e, 2j, 4, 5e, 5g, 10a, 10c, 12. Section 13.4, problems 2a, 2b, 2d, 2f, 3a, 3c, 10. Section 13.5, problems 2, 3, 6, 8, 9.