Math 351 Homework 2

Due Friday, September 16 at 5pm

Solutions should be written LaTeX or Markdown and converted to a PDF. You are encouraged to work with others on the assignment, but you should write up your own solutions independently. This means no copy pasting. You should reference all of your sources, including your collaborators.

1. Use Theorem 1.2.10 to deduce that $\lim_{x\to\infty} \frac{\pi(x)}{x} = 0$.
2. Suppose a, b and n are positive integers. Prove that if $a^n \mid b^n$, then $a \mid b$.
3. Prove that if a positive integer n is a perfect square, then n cannot be written in the form $4k + 3$ for k an integer. (Hint: Compute the remainder upon division by 4 of each of $(4m)^2$, $(4m + 1)^2$, $(4m + 2)^2$, and $(4m + 3)^2$.)
4. Prove that there are infinitely many primes of the form $6x - 1$.