Number Theory HW Week 3

1. Explain why or why not each of the following have solutions.
2. $6x+51y=22$
3. $33x+14y=115$
4. Find all solutions to the one above that does have solutions.
5. Use the prime number theorem to estimate how many primes there are less than 100 *and* find the number of primes less than 100.
6. It has been conjectured that there are infinitely many primes of the form $n^{2}+1$. Find the first 5 such primes.
7. It has been conjectured that there are infinitely many primes of the form $2^{n}-1$. Find the first 4 such primes.

Point values: 1 is worth 5, 2 is worth 8, 3,4,5 are worth 4.