Problems

1. Prove that 5 is a congruent number by finding a triangle with rational sides and area 5. Use this to find 3 non-trivial points on $y^2 = x^3 - 25x$.

2. Let $\sum b(n)q^n = \eta^2(4z)\eta^2(8z)$. Let E be the elliptic curve $y^2 = x^3 - x$. Find $a(p)$ for many primes p.
   2.1 Do you notice a pattern?
   2.2 Compare to $b(p)$. Do you notice a pattern?

3. Prove BSD.