

Beauty of Mathematics Decal PSET #9

Due 11/15

Let's consider the integers mod 7, which consists of the numbers $\{0, 1, 2, 3, 4, 5, 6\}$.

1. Remember we should be able to divide; so which of these numbers is $1/2$? (That is, which number can we multiply by 2 to get 1?)
2. Some of these numbers are squares, and others are not. Show that 3 is the "square root" of 2, but that 5 has no square root.

Now let's instead consider the integers mod 6, consisting of $\{0, 1, 2, 3, 4, 5\}$.

3. Show that there is no $1/2$ here; that is, multiplying something by 2 will never give 1.

Observe that we can't necessarily divide mod 6, but we can divide mod 7. This is because 7 is prime and 6 is not.