

## HOMEWORK 1

1. For every positive integer  $n$ , prove that

$$1 + 2 + \dots + n = \frac{n(n+1)}{2}.$$

2. For every positive integer  $n$ , prove that  $n^3 \equiv n \pmod{6}$ .
3. Let  $S$  be the set of real numbers. If  $a, b \in S$  define  $a \sim b$  if  $a - b$  is an integer. Show that  $\sim$  is an equivalence relation on  $S$ . Describe the equivalence classes of  $S$ .
4. for  $n \geq 3$ , describe the elements of  $D_n$ . (*Hint*: you will need to consider two cases,  $n$  even and  $n$  odd.) How many elements does  $D_n$  have?
5. Associate the number 1 with a rotation and  $-1$  with a reflection. Describe an analogy between multiplying these two numbers and multiplying elements of  $D_n$ .
6. Draw a figure whose symmetry group is the cyclic rotation group of order 6. Explain why the symmetry group of this figure is not the dihedral group.