

## Homework 1

1. Find all integers  $n$  such that

$$\frac{69 - 6n}{2n + 1}$$

is also an integer.

2. Prove that  $15x^2 - 7y^2 = 9$  has no solutions in  $\mathbb{Z}$ .
3. Show that the equation

$$y^2 = x(x + 1)(x + 2)(x + 3)$$

has no solutions in positive integers.

4. Prove that an integer of the form  $8n + 7$  cannot be written as a sum of three integer squares.
5. Find all pairs of positive integers  $(n, m)$  such that

$$(m + 1)! + (n + 1)! = m^2 n^2.$$