Name____**ID** _______________________

Activity 3-1 (23 Aug 2018)

1. [Proof by cases] Prove the following statement: If x and y are integer and $x^2 + y^2$ is even, then $x + y$ is even.

Note: When you want to prove this statement: "If x and y are integers and $x^2 + y^2$ are even, then x + y is even. ". You can think of it as: "If x and y are integers, then (if $x^2 + y^2$, then x+y is even)". That is because (P and Q) => R is equivalent to (P => (Q => R)). Therefore, in this case, you can start by assuming that x and y are integers.

2. (source: LPV) Prove by induction on k that for any integer $k \geq 1$, we have that

$$1+3+\cdots+(2k+1)=k^2$$

State the property $P(k)$:

$P(k)$	

Basic step: *(show that P(1) is true)*

Induction step: (assume $P(m)$ and show $P(m+1)$, for any m>=1)

State the Induction Hypothesis $P(m)$:

$P(m)$	

State the goal $P(m+1)$

$P(m+1)$	