Incorrect induction proof

(1) $\sum_{i=1}^{n} i = (n+1)^2/2$, for $n \geq 1$:

Inductive step is fine, base step is bad

(2) All horses are same color:

Base case: 1 horse ✓

Inductive step: $k+1$ horses: first k are same color
last k are same color
∴ all same color

Error: $k=2$

(3) n, ~~y~~ positive integer. x, y positive integers satisfying $\max(x,y) = n$
Then $x=y$.

Base case: $n=1$, fine
Inductive step: $\max(x,y) = k+1$, so $\max(x-1, y-1) = k$, so $x=y$

Error: might have $x-1$ or $y-1 = 0$.

(4) All ~~non-parallel~~ lines intersect in a common point.

Base case: 2 lines

Inductive step: Take first k lines, last k lines.
(common point) (common point)
middle $k-1$ lines in common, so all intersect in common point

Error: $k=3$.