

6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

# Bogus Induction

Albert R Meyer February 24, 2012 lec 3F.1

6	9	13	7
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15	8	11	2

## A Bogus Proof

Theorem: All horses are the same color.

**Proof:** (by induction on  $n$ )

Induction hypothesis:  
 $P(n) ::=$  any set of  $n$  horses are the same color



Albert R Meyer February 24, 2012 lec 3F.2

6	9	13	7
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## A Bogus Proof

Theorem: All horses are the same color.

**Proof:** (by induction on  $n$ )

Induction hypothesis:  
 $P(n) ::=$  any set of  $n$  horses are the same color

**Base case ( $n=1$ ):**  
 horse is same color as itself!



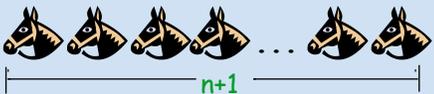
Albert R Meyer February 24, 2012 lec 3F.3

6	9	13	7
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## A Bogus Proof

**(Inductive case):** Assume  $n$  horses have the same color.

Prove that any  $n+1$  horses have the same color.



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6	9	13	7
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## A Bogus Proof

**(Inductive case):** Assume  $n$  horses have the same color.

Prove that any  $n+1$  horses have the same color.

2nd set of  $n$  horses have the same color



first set of  $n$  horses have the same color

Albert R Meyer February 24, 2012 lec 3F.5

6	9	13	7
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## A Bogus Proof

**(Inductive case):** Assume  $n$  horses have the same color.

Prove that any  $n+1$  horses have the same color.

2nd set of  $n$  horses have the same color



first set of  $n$  horses have the same color

Albert R Meyer February 24, 2012 lec 3F.6

6	9	13	7
12		10	5
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## A Bogus Proof

1<sup>st</sup> and last 🐎 same color as the middle ones QED ?!?

so set of  $n+1$  have the same color!

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6	9	13	7
12		10	5
3	1	4	14
15	8	11	2

## A Bogus Proof

### What's wrong?

Proof that  $P(n) \rightarrow P(n+1)$  is wrong if  $n = 1$ , because there are no "middle" horses!

2<sup>nd</sup> set of  $n=1$  horses

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6	9	13	7
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## A Bogus Proof

### What's wrong?

Proof that  $P(n) \rightarrow P(n+1)$  is wrong if  $n = 1$ , because there are no "middle" horses!

mislead by ellipsis

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6	9	13	7
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## A Bogus Proof

### What's wrong?

Proof that  $P(n) \rightarrow P(n+1)$  is wrong if  $n = 1$ , because there are no "middle" horses!

(But proof works for all  $n \neq 1$ )

Albert R Meyer February 24, 2012 lec 3F.10

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