

# **CIT 5920 — Lecture 24: Recap Induction/Graphs**

05 - 05 Dec 2024

Poll results

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**Which topic would you like to do induction on first?**

0 2 5

Graphs



52 %

Not graphs? (integers)



48 %

## What would like to do now?

020

Another proof on graphs

 10 %

Reviewing induction

 55 %

More examples of induction on integers

 35 %

## Interested in strong induction?

0 2 4

Yes, on graphs



25 %

Yes, on numbers



38 %

Yes, either way



38 %

No



0 %

Quiz: Intro to Induction (1/7)

032

**What is the base case in an induction proof that aims to show the sum of the first  $N$  odd numbers equals  $N^2$ ?**

$n = 0$

☐ 3 %

$n = 1$  ☒

☒ 94 %

$n = 2$

☐ 0 %

$n = 3$

☐ 3 %

Quiz: Intro to Induction (2/7)

030

**In an induction proof, what is the term used for the assumption that the theorem holds for  $N-1$ ?**

Base assumption

 10 %

Induction hypothesis ✓

 67 %

Recursive assumption

 23 %

Proof base

 0 %

**Which of the following is a correct statement of the inductive step in a proof?**

If  $P(n)$  is true, then  $P(n + 1)$  is true. ✓



If  $P(n - 1)$  is true, then  $P(n)$  is true. ✓



If  $P(n + 1)$  is true, then  $P(n)$  is true.



If  $P(n)$  is true, then  $P(n - 1)$  is true.





Quiz: Intro to Induction (4/7)

0 2 7

**Which of the following is true for all natural numbers  $N$  according to the principle of mathematical induction?**

If a statement is true for  $N$ , it is true for  $N + 1$ .

☐ 7 %

If a statement is true for  $N - 1$ , it is true for  $N$ .

☐ 7 %

If a statement true for  $N$  implies it is true for  $N + 1$ , it is true for all natural numbers.



☐ 85 %

If a statement is true for 1, it is true for all natural numbers.

☐ 0 %

Quiz: Intro to Induction (5/7)

026

**In the context of induction, what does the "base case" provide?**

A starting point for the inductive process ✓



A general case for the proof



An ending condition for the proof



A contradiction to the hypothesis



Quiz: Intro to Induction (6/7)

030

**In the context of induction, what is the purpose of the inductive step?**

To prove the base case

 7 %

To show the general case

 30 %

To demonstrate the transition from  $N-1$  to  $N$  ✓

 50 %

To provide a counterexample

 0 %

To show that the property tends to infinity

 13 %

**Which of these is a condition of the base case?**

It must start with  $N=1$ .

☐ 0 %

It must prove the statement for the smallest value of  $n$  for which the statement is designed to hold.



☒ 100 %

It must include all possible values of  $M$ .

☐ 0 %

It must prove the statement for  $N=0$  only.

☐ 0 %

## Review session, next week?

0 2 8

Yes, 1h30



Yes, 3h



No



Yes, maybe



## Do you want the sample exam

0 2 3

Covered in recitation/lecture



48 %

Just handed to you



52 %