Week 5 - Monday

COMP 2230

Last time

- Sequences
- Summation notation
- Product notation
- Mathematical induction

Questions?

Assignment 2

Logical warmup

- Roger Rabbit needs to hop down ten stairs.
- He can hop down either one or two steps at a time.
- How many different ways can he get down the stairs?

Exam 1 Post Mortem

Induction Examples

Proof by mathematical induction

- To prove a statement of the following form:
  - $\forall n \in \mathbb{Z}$, where $n \geq a$, property $P(n)$ is true
- Use the following steps:
  1. Basis Step: Show that the property is true for $P(a)$
  2. Induction Step:
     - Suppose that the property is true for some $n = k$, where $k \in \mathbb{Z}, k \geq a$
     - Now, show that, with that assumption, the property is also true for $k + 1$

Geometric series

- Prove that, for all real numbers $r \neq 1$

$$\sum_{i=0}^{n} r^i = \frac{r^{n+1} - 1}{r - 1}$$

- **Hint:** Use induction
- This is the sum of a geometric sequence, also known as a geometric series
- This result generalizes our example with the sum of powers of 2
- There is a small issue for ***r*** = 0, but Epp ignores it

Ticket Out the Door

Upcoming

Next time…

- Finish induction examples
- Strong induction
- Recursively defined sequences
- Solving recurrence relations by iteration

Reminders

- Keep working on Assignment 2
- Read 5.4, 5.6, and 5.7