Today's topics

- Integers & Number Theory
  - Integers
  - Division, GCD
  - Euclidean Alg
  - Mod!

- Reading: Sections 2.4-2.6
- Upcoming
  - **Sequences, Summations, & Induction**

Forward Reasoning

- Have premises *p*, and want to prove *q*.
  - Find a s_1 such that $p \rightarrow s_1$
    - Then, modus ponens gives you s_1.
  - Then, find an s_2 ∋ (such that) $s_1 \rightarrow s_2$.
    - Then, modus ponens gives you s_2.
  - And hope to eventually get to an $s_n \ni s_n \rightarrow q$.
- The problem with this method is…
  - It can be tough to see the path looking from *p*.

Backward Reasoning

- It can often be easier to see the *very same path* if you just start looking from the conclusion q instead…
  - That is, *first* find an s_{-1} such that $s_{-1} \rightarrow q$.
  - *Then*, find an $s_{-2} \ni s_{-2} \rightarrow s_{-1}$, and so on…
  - Working back to an $s_{-n} \ni p \rightarrow s_{-n}$.
- Note we *still* are using *modus ponens* to propagate truth *forwards* down the chain from p to s_{-n} to … to s_1 to q!
  - We are *finding* the chain *backwards*, but *applying* it *forwards*.
  - This is not quite the same thing as an indirect proof…
    - In that, we would use *modus tollens* and $\neg q$ to prove $\neg s_{-1}$, *etc*.
  - However, it it similar.