Fallacies

- A *fallacy* is an inference rule that is not logically valid.
  - May yield a false conclusion!
- Fallacy of *affirming the conclusion*:
  - "$p \rightarrow q$ is true, and q is true, so p must be true." (No, because $\mathbf{F} \rightarrow \mathbf{T}$ is true.)
- Fallacy of *denying the hypothesis*:
  - "$p \rightarrow q$ is true, and p is false, so q must be false." (No, again because $\mathbf{F} \rightarrow \mathbf{T}$ is true.)

Common Fallacies - Examples

"If you do every problem in this book, then you will learn discrete mathematics. You learned discrete mathematics."

p: *"You did every problem in this book"*

q: *"You learned discrete mathematics"*

- Fallacy of *affirming the conclusion*:

  $p \rightarrow q$ *and* q does not imply p

- Fallacy of *denying the hypothesis*:

  $p \rightarrow q$ and $\neg p$ does not imply $\neg q$