Before Class:
- **Journal Up**

1. Problem Basics
   - What is a Problem?
   - Set $I$ of possible instances ...
   - How do we solve a problem?
   - ... mapped to a set $S$ of problem solutions
   - Sorting example
   - Solving a problem means taking an instance in $I$ and returning the solution from $S$
   - Therefore, what is a method for solving any problem?
   - How fast will this method be?
   - Can this always be done?
   - Halting Problem
   - Undecidable

2. The Class $P$
   - Decision Problems
   - How do Decision Problems relate to Optimization Problems
   - Now we’re trying to prove that things are at least this hard (like lower bound)
   - What is polynomial?
   - What does polynomial-time solvable mean?
   - Path, Median... Examples?
   - Set of all problems that can be solved in time linear in input size
   - What does polynomial-time verifiable mean?

3. The Class $NP$
   - Can feed any string back to it
   - The set of all problems that are poly-time verifiable
   - $P$ is contained in $NP$
   - Non-determinism
   - Does $P=NP$?

Next Class:
- **How do we answer this question?**
- **Evaluations!**