How can we generate test cases?

1. Random testing
   a. Call methods at random in each class
      i. Simple for primitive types
   b. Problems:
      i. How many tests to generate
      ii. How to cover all the statements?

   How can we be smarter than Random Testing?

2. Seeding
   a. Look for constants in the byte code
      i. Integers, double, string
   b. Create a pool of values from these constants
   c. When sampling at random, with prob P rather sample from the pool

3. Search based algorithms
   a. Genetic algorithm
   b. 3 things that are important in search-based algorithms
      i. Search space
         1. The set of all possible tests for a given problem
      ii. Search operators
         1. How to modify the tests to explore the search space?
      iii. Fitness function
         1. Evaluate how good the solution (test case/test Suite) is
         2. Does it cover new instructions?
         3. How close is the test to cover new instructions?
            a. Need some heuristics
               i. Branch coverage
               ii. Hill climbing
               iii. Genetic algorithms