Test Coverage & Adequacy1

Goodenough & Gerhart ['75]

- What is a software test adequacy criterion
  - Predicate that defines "what properties of a program must be exercised to constitute a thorough test", i.e., one whose successful
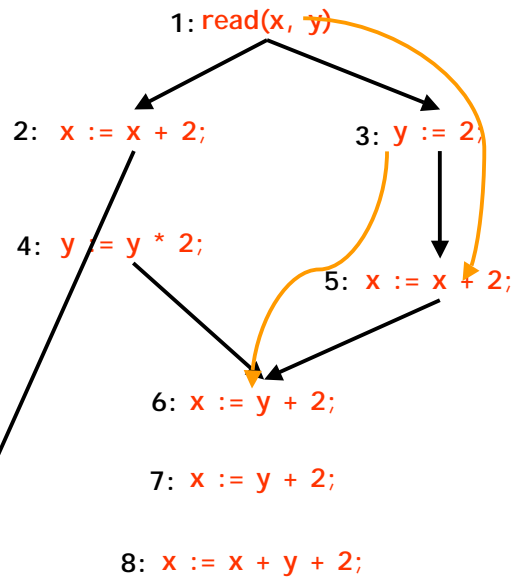
Structural Testing

- **Program-based structural testing**
  - **Control-flow based adequacy criteria**
    - Statement coverage
    - Branch coverage
    - Path coverage
      - Length-i path coverage
    - Cyclomatic number criterion
      - Set of v independent paths, where $v = e - n + 1$
    - Multiple condition coverage
      - All possible combinations of truth values of predicates
  - **Data-flow based adequacy criteria**

Structural Testing

  - **Data-flow based adequacy criteria**
    - All definitions criterion
      - Each definition to some _reachable_ use
    - All uses criterion
      - Definition to each reachable use
    - All def-use criterion

Data-flow Testing

1: read(x, y)

2: x := x + 2;

3: y := 2;

4: y := y * 2;

5: x := x + 2;

6: x := y + 2;

7: x := y + 2;

8: x := x + y + 2;

All Uses Criterion

read(x, y, z)

x := x + 2;   y := 2;

                                x := x + 2;

            x := y + 2;