**DATA FLOW COVERAGE MEASURES (I)**

1. **def(x)**
   - set of all nodes in CFG with def access to x;

2. **p-use(x)**
   - set of all arcs in CFG with p-use access to x;

3. **c-use(x)**
   - set of all nodes in CFG with c-use access to x;

4. **def-clear(x)**
   - \(\{ (s_0, s_n) , s_0 \in \text{def}(x), s_j \notin \text{def}(x), \forall i = 1, \ldots, n, s_i \neq s_j , \forall i, j = 1, \ldots, n, i \neq j \}\)
   - for all \(s \in \text{def}(x)\) we define

5. **dpu(s,x)**
   - \(\{ s', (s, s') \in \text{def-clear}(x) \text{ and } s' \in \text{p-use}(x) \}\)

6. **dcu(s,x)**
   - \(\{ s', (s, s') \in \text{def-clear}(x) \text{ and } s' \in \text{c-use}(x) \}\)

7. **du(s,x)**
   - \(\text{dpu}(s, x) \cup \text{dcu}(s, x)\)

**DATA FLOW COVERAGE MEASURES (II)**

For all program variables \(x\) and for all nodes \(s\) in \(\text{def}(x)\),
the test suite contains the following paths \((s, s') \in \text{def-clear}(x)\):

(a) **ALL-DEFS:**
   - one path \((s, s'), s' \in \text{dpu}(s, x) \cup \text{dcu}(s, x)\)
   - each variable definition is used at least once

(b) **ALL-P-USES:**
   - \(\forall s' \in \text{dpu}(s, x)\)
   - covers branch testing

(c) **ALL-C-USES:**
   - \(\forall s' \in \text{dcu}(s, x)\)
   - each variable definition is tested in all its computational uses

(d) **ALL-P-USES/SOME-C-USES:**
   - \(\forall s' \in \text{dpu}(s, x)\)
   - covers (a), (b)

(e) **ALL-C-USES/SOME-P-USES:**
   - \(\forall s' \in \text{dcu}(s, x)\)
   - covers (a), (c)

(f) **ALL-USES:**
   - \(\forall s' \in \text{du}(s, x)\)
   - covers (e), (d)

(g) **ALL-DU-PATHS**
   - all paths \((s, s') \forall s' \in \text{du}(s, x)\)
   - covers (f)