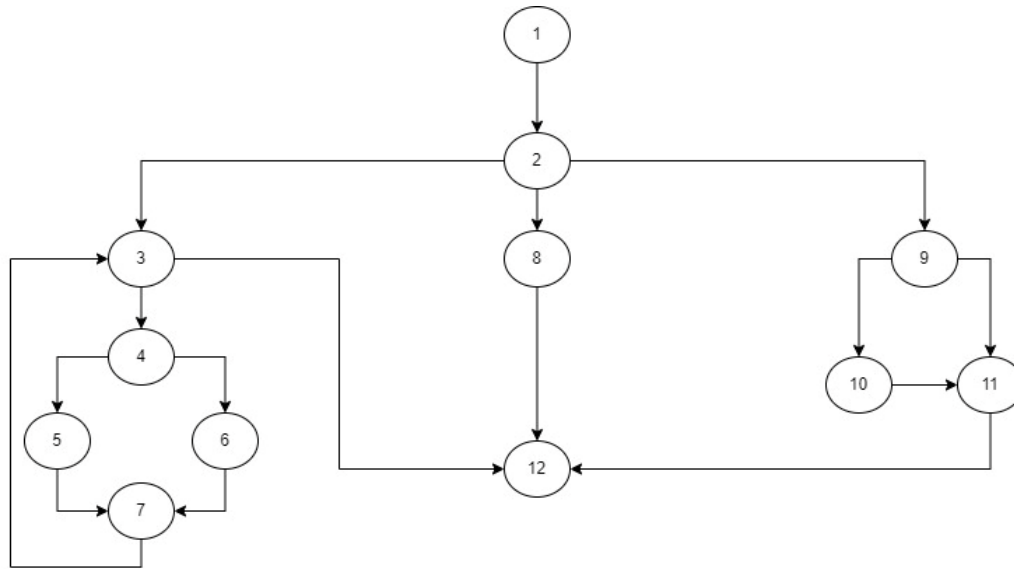1.

2. **All-Nodes Criterion:**

Test requirements = {[1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12]}

Test paths: t1 = [1, 2, 3, 4, 5, 7, 3, 4, 6, 7, 3, 12]

                  t2 = [1, 2, 8, 12]

                  t3 = [1, 2, 9, 10, 11, 12]

Test suites = {t1, t2, t3}

All-Edges Criterion

Test requirements = {[1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [1, 2], [2, 3], [3, 4], [4, 5], [4,6], [5, 7], [6, 7], [7, 3], [3, 12], [2, 8], [8, 12], [2,9], [9, 10], [10, 11], [11, 12], [9, 11]}

Test paths: t1 = [1, 2, 3, 4, 5, 7, 3, 4, 6, 7, 3, 12]

                  t2 = [1, 2, 8, 12]

                  t3 = [1, 2, 9, 10, 11, 12]

                  t4 = [1, 2, 9, 11, 12]

Test suites = {t1, t2, t3, t4}

All-Edge-Pairs Criterion

Test requirements = {[1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [1, 2], [2, 3], [3, 4], [4, 5], [4,6], [5, 7], [6, 7], [7, 3], [3, 12], [2, 8], [8, 12], [2,9], [9, 10], [10, 11], [11, 12], [9, 11], [1, 2, 3], [1, 2, 8], [1, 2, 9], [2, 3, 4], [2, 3, 12], [2, 8, 12], [2, 9, 10], [2, 9, 11], [3, 4, 5], [3, 4, 6], [4, 5, 7], [4, 6, 7] [5, 7, 3], [6, 7, 3], [7, 3, 4], [7, 3, 12], [9, 10, 11], [9, 11, 12], [10, 11, 12]}

Test paths: t1 = [1, 2, 3, 4, 5, 7, 3, 4, 6, 7, 3, 12]

                  t2 = [1, 2, 8, 12]

                  t3 = [1, 2, 9, 10, 11, 12]

                  t4 = [1, 2, 9, 11, 12]

                  t5 = [1, 2, 3, 12]

Test suites = {t1, t2, t3, t4, t5}

Prime Path Criterion

Test requirements = {[1, 2, 3, 4, 5, 7], [1, 2, 3, 4, 6, 7], [1, 2, 3, 12], [1, 2, 8, 12], [1, 2, 9, 10, 11, 12], [1, 2, 9, 11, 12], [3, 4, 5, 7, 3], [3, 4, 6, 7, 3], [4, 5, 7, 3, 4], [4, 6, 7, 3, 4], [4, 5, 7, 3, 12], [4, 6, 7, 3, 12], [5, 7, 3, 4, 5], [5, 7, 3, 4, 6], [6, 7, 3, 4, 6], [6, 7, 3, 4, 5], [7, 3, 4, 5, 7], [7, 3, 4, 6, 7]}

Test paths: t1 = [1, 2, 3, 4, 5, 7, 3, 4, 6, 7, 3, 12]

          t2 = [1, 2, 8, 12]

          t3 = [1, 2, 9, 10, 11, 12]

          t4 = [1, 2, 9, 11, 12]

          t5 = [1, 2, 3, 12]

          t6 = [1, 2, 3, 4, 6, 7, 3, 4, 5, 7, 3, 12]

          t7 = [1, 2, 3, 4, 5, 7, 3, 4, 5, 7, 3, 4, 6, 7, 3, 4, 6, 7, 3, 12]

Test suites = {t1, t2, t3, t4, t5, t6, t7}

Simple Round Trip

Test requirements = {[3, 4, 5, 7, 3], [4, 5, 7, 3, 4], [5, 7, 3, 4, 5], [6, 7, 3, 4, 6], [7, 3, 4, 5, 7]}

Test paths: t7 = [1, 2, 3, 4, 5, 7, 3, 4, 5, 7, 3, 4, 6, 7, 3, 4, 6, 7, 3, 12]

Test suites = {t7}

Complete Round Trip Criterion

Test requirements = {[3, 4, 5, 7, 3], [3, 4, 6, 7, 3], [4, 5, 7, 3, 4], [4, 6, 7, 3, 4], [5, 7, 3, 4, 5], [6, 7, 3, 4, 6], [7, 3, 4, 5, 7] [7, 3, 4, 6, 7]}

Test paths: t7 = [1, 2, 3, 4, 5, 7, 3, 4, 5, 7, 3, 4, 6, 7, 3, 4, 6, 7, 3, 12]

Test suites = {t7}

3. We can take the example of the test suite {[1, 2, 3]} where it meets the requirements of All-Nodes but misses edge [1,3]. Therefore, the All-Nodes criterion does not subsume All-Edges criterion.

4. In the graph I have created the only Complete Round Trips test requirements are [2, 3, 2] and [3, 2, 3]. To satisfy this we only need the test path [1, 2, 3, 2, 3, 2, 4]. This test path does not hit [1,4] and thus is not All-Edges adequate. Therefore, the Complete Round Trip criterion does not subsume the All-Edges criterion.