Program Graphs - Examples

1. Draw the program graph using the line numbers to label all nodes in the graph.

2. Compute the cyclomatic number for each problem below. Use the three methods discussed in class:

 # conditions + 1
|E| - |V| + 2
 # Regions + 1

Calculate P* based on the looping conditions indicated with each problem.

Example 1:

```
1.  void Q1 () {
2.      S0 ();
3.      if (C1) {
4.          S1 ();
5.          while (C2) {
6.              if (C3) {
7.                  S2 ();
8.              }
9.              else {
10.                 S3 ();
11.             }
12.             S4 ();
13.         }
14.         S5 ();
15.     }
16.     else {
17.         S6 ();
18.     }
19.     S7 ();
20. }
```

For P*, assume the while statement at line 5 loops exactly 4 times.

Example 2:

```
1.  void Q2 () {
2.      S0 ();
3.      if (C1) {
4.          S1 ();
5.          do {
6.              S2 ();
7.              if (C2) {
8.                  S3 ();
9.              }
10.             S4 ();
11.         } while (C3)
12.         S5 ();
13.     }
14.     else {
15.         if (C4) {
16.             S6 ();
17.         }
18.         S7 ();
19.     }
20.     S8 ();
21. }
```

For P*, assume the do-while statement at line 5 loops 1, 2, or 3 times.

Example 3:

```
1.  void Q3 () {
2.      S0 ();
3.      if (C1) {
4.          S1 ();
5.          for (int i=0; C2; i++) {
6.              S2 ();
7.              while (C3) {
8.                  S3 ();
9.              }
10.             S4 ();
11.         }
12.         S5 ();
13.     }
14.     else {
15.         if (C4) {
16.             S6 ();
17.         }
18.         S7 ();
19.     }
20.     S8 ();
21. }
```

For P*, assume the for statement at line 5 loops 4 times and the while statement and line 7 loops 1, 2, or 3 times.

Example 4:

```
1.  void Q4 () {
2.      S0 ();
3.      if (C1 || C2) {
4.          S1 ();
5.          while (C3) {
6.              S2 ();
7.              if (C4&& C5 && C6) {
8.                  S3 ();
9.              }
10.             else {
11.                 S4 ();
12.             }
13.             S5 ();
14.         }
15.         S6 ();
16.     }
17.     else {
18.         for (int i=0; C7; i++) {
19.             S7 ();
20.         }
21.         S8 ();
22.     }
23.     S9 ();
24. }
```

For P*, assume the while statement at line 5 loops 3 times and the for statement and line 18 loops exactly 24 times.