SQA Assignment 1 – Fall 2020

Due: 11:59PM, Friday, October 2, Submit through Canvas

Questions? Contact TA Xiaopu Peng <xzp0007@auburn.edu>

Problem Descriptions:

The purpose of this assignment is to reinforce the material on program graphs from lecture.

For each of the four problems below:

(15 pts) 1. Draw the program graph. You must use line numbers to label all nodes in the graph. Do not use the statements or statement fragments themselves as nodes labels.

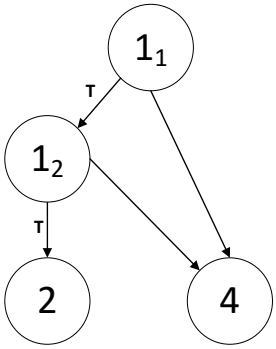
(5 pts) 2. Compute the cyclomatic number using each of the three methods discussed in class. Show your work.

(5 pts) 3. Calculate the P* using the given conditions under each problem. Show your work.

Hint:

```
1       if (C1 && C2)
2               S1;
3       else
4               S2;
```

For the program slice above, the program graph should be drawn below:



Problem 1:

```
1       void Q1(){
2               S1;
3               if(C1&&C2){
4                       S2;
5               }
6               else if(C3){
7                       S3;
8                       if(C4){
9                               S4;
10                      else{
11                              S5;
12                      }
13              }
14              else{
16                      S6;
17              }
18              S7;
19      }
```

Problem 2:

```
1       void Q2(){
2               S1;
3               if(C1 && C2) {
4                       for(S2;C3;S3){
5                               if(C4 && C5){
6                                       S4;
7                               }
8                               else{
9                                       S5;
10                              }
11                      }
12              }
13              else{
14                      if(C6 && C7) {
15                              S6;
16                              If(C8){
17                                      S7;
18                              }
19                      }
20                      else {
21                              S8;
22                      }
23              }
24              S9;
25      }
```

For P*, suppose the for loop (line 4) executed exactly 3 times.

Problem 3:

```
1       void Q2(){
2               S1;
3               if(C1 && C2){
4                       S2;
5               }
6               else{
7                       for(S3;C3;S4){
8                               S5;
9                               if(C4){
10                                      S6;
11                              }
12                      }
13              }
14              if(C5){
15                      for(S7;C6;S8){
16                              S9;
17                      }
18              }
19              else{
20                      S10;
21              }
22              S11;
23      }
```

For P*, suppose the for loop defined by Line 7 may be executed anywhere from 0 to 3 times, the for loop defined by Line 15 is executed exactly 3 times.

Problem 4:

```
1       void Q4(){
2               S1;
3               while(C1){
4                       if(C2 && C3){
5                               S2;
6                       }
7                       else if(C4 && C5){
8                               S3;
9                       }
10                      else{
11                              S4;
12                      }
13                      while(C6){
14                              S5;
15                              if(C7){
16                                      S6;
17                              }
18                              else{
19                                      while(C8){
20                                              S7;
21                                      }
22                              }
23                      }
24                      S8;
25              }
26      }
```

For P*, suppose the while loops defined by lines 3, 13 and 19 are executed exactly 2, 2 and 3 times respectively.