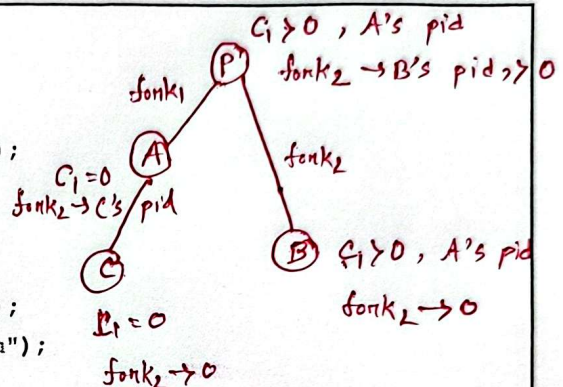**United International University**
Course: Operating Systems (CSE 4509), Spring 2025
Class Test 1
Total Marks: 20, Time: 30 minutes

1) Consider the following program

```
1.      int c1 = fork();
2.      if(fork() || c1 == 0)
3.      {
4.          printf("Catch me\n");
5.      }
6.      else if(c1 > 0)
7.      {
8.          waitpid(c1, NULL, 0);
9.          printf("If you can\n");
10.     }else
11.     {
12.         exit(0);
13.         printf("Now you see me\n");
14.     }
```

(handwritten process tree annotations):

P — $c_1 > 0$, A's pid; $fork_2 \to$ B's pid$\,,> 0$

$fork_1$

A — $c_1 = 0$, $fork_2 \to$ C's pid

$fork_2$

B — $c_1 > 0$, A's pid; $fork_2 \to 0$

C — $c_1 = 0$; $fork_2 \to 0$

Output
Catch me (P)
Catch me (A)
If you can (B)
Catch me (C)

a) Draw the process tree for the above program [5]
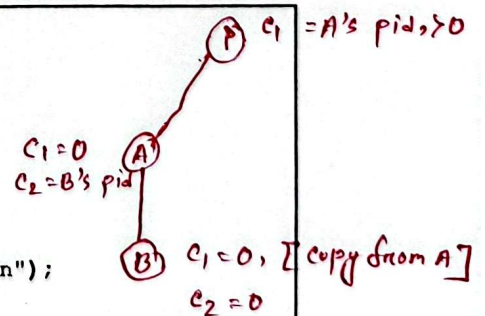b) What will be the output of the program? [3]

2) How does the shell (your terminal) execute commands? Explain using fork, wait and exec system calls. [4]

3) Consider the following program:

```
1.      if(!fork() && fork())
2.      {        c1              c2
3.          printf("I must print\n");
4.      }
5.      else
6.      {
7.          printf("Will I be printed again?\n");
8.      }
```

(handwritten process tree annotations):

P — $c_1 = $ A's pid$,> 0$

A — $c_1 = 0$, $c_2 = $ B's pid

B — $c_1 = 0$, [copy from A]; $c_2 = 0$

a) Draw the process tree for the above program [5]
b) What will be the output of the program? [3]

order does not matter

Output:
Will I be printed again?
I must print
Will I be printed again?