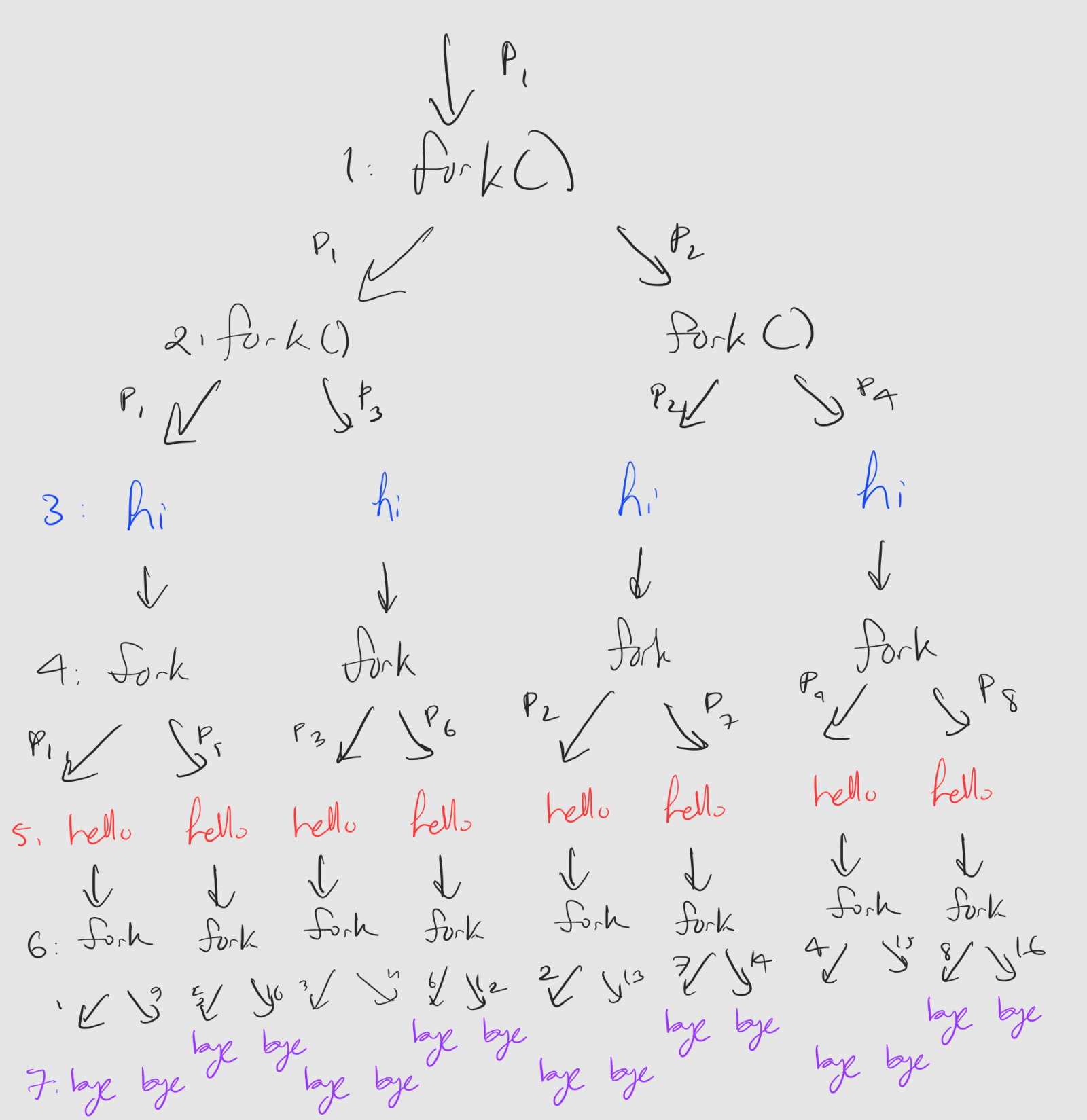
1. Find outputs of the following code.

```
main(){
    1 fork();
    2 fork();
    3 printf("hi\n");
    4 fork();
    5 printf("hello\n");
    6 fork();
    7 printf("bye\n");
}
```



hi: 4

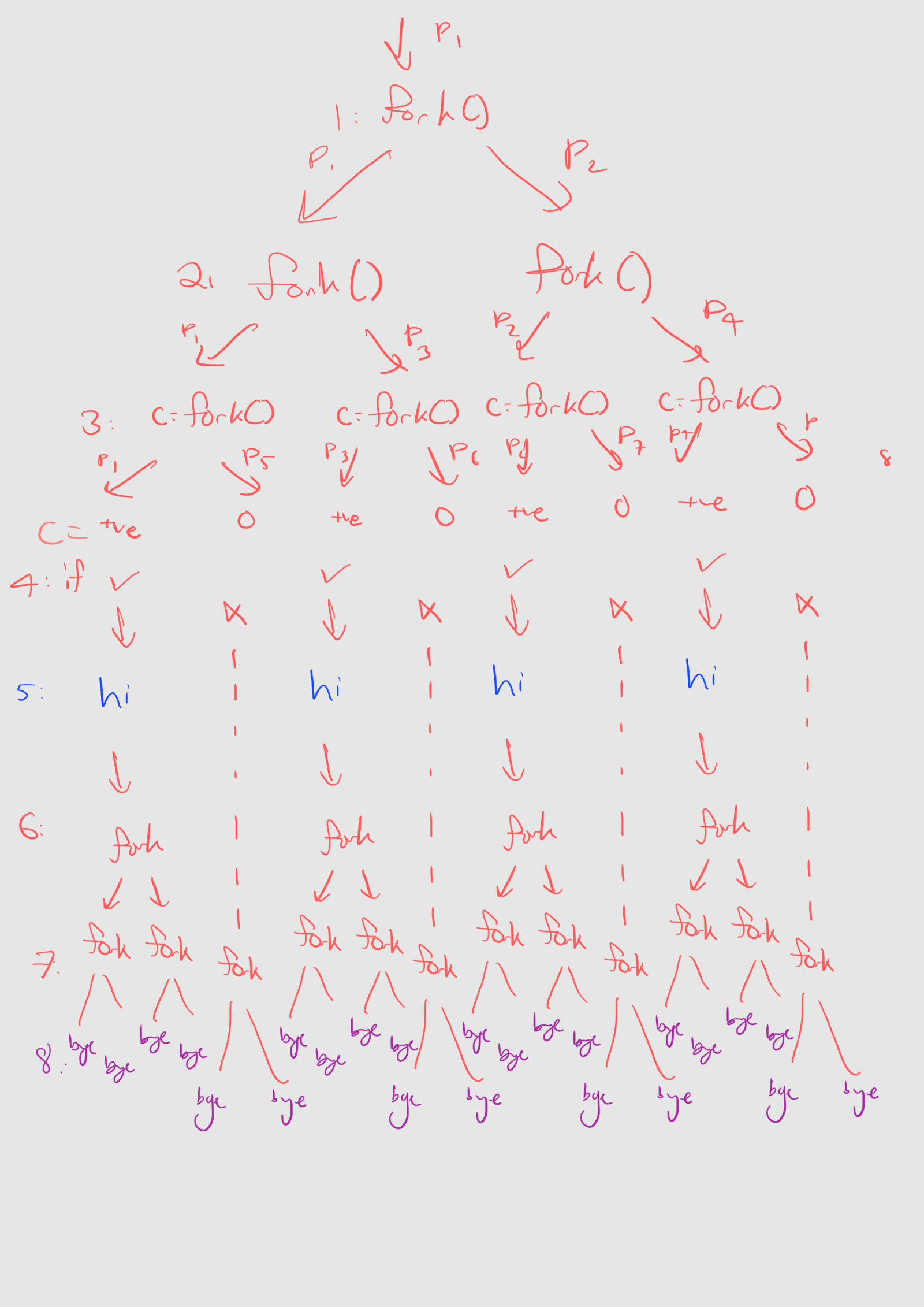
hello: 8

bye: 16

In some order. Try running the code to see it.

2. Find outputs of the following code.

```
main(){
    1  fork();
    2 fork();
     3 c=fork();
    4 if(c>0){
            5 printf("hi\n");
            6 fork();
      }
    7 fork();
    8 printf("bye\n");
}
```


P1
1: fork()
P1
P2
2: fork()
fork()
P1
P3
P2
P4
3: c=fork()
c=fork()
c=fork()
c=fork()
P1
P5
P3
P6
P4
P7
P7
P
8
C= +ve
0
+ve
0
+ve
0
+ve
0
4: if
5: hi
hi
hi
hi
6:
fork
fork
fork
fork
7:
fork fork
fork fork
fork fork
fork fork
fork
fork
fork
fork
8:
bye bye bye bye bye bye bye bye bye bye bye bye bye bye bye bye
bye
bye
bye
bye
bye
bye
bye
bye

3. Find outputs of the following code.

```
int main(){
    pid_t p;
    int a=3;
    int b=11;
    char s[20];
    p=fork();
    if(p<0){
        printf("fork failed\n");
    }
    else if(p==0){
        strcpy(s,"child");
        a=a*b;
        b=b/a;
    }
    else{
        wait();
        strcpy(s,"parent");
        a=a+b;
        b=b-a;
    }
    printf("%s is printing a= %d\n",s,a);
    printf("%s is printing b= %d\n",s,b);

    return 0;
}
```

Only one fork (line 5), so more important is tracking the values

line	P_1	P_2
1-5	a = 3 b = 11 s = " "	N/A
6-11	a = 3 b = 11 s = " "	a = 33 b = 0 s = child
12-16	a = 14 b = -3 s = parent	a = 33 b = 0 s = child

17: parent is printing a = 14

child is printing a = 33

18. parent is printing b = -3

child is printing b = 0

4. Find outputs of the following code.

```
static int a=5;
static int b=3;
int main(){
    pid_t x, y;
    x=fork();
    if(x<0){
        printf("fork failed\n");
    }
    else if(x>0){
        a=a+5;
        b=b-5;
        wait();
        y=fork();
        if(y<0){
            printf("fork failed\n");
        }
        else if(y>0){
            wait();
            a=a-2;
            b=b+2;
        }
        else{
            a=a*2;
            b=b/3;
        }
    }
    else{
        a=a/2;
        b=b*3;
    }
    printf("a= %d\n",a);
    printf("b= %d\n",b);

    return 0;
}
```

	P_1	P_2	P_3
1-2	a = 5 b = 3	N/A	N/A
2-5	a = 5 b = 3	a = 5 b = 3	N/A
6-9	a = 10 b = -2	a = 5 b = 3	N/A
10-11	a = 10 b = -2	a = 5 b = 3	a = 10 b = -2
12-15	a = 8 b = 0	a = 5 b = 3	a = 10 b = -2
16-18	a = 8 b = 0	a = 5 b = 3	a = 20 b = 0
19-21	a = 8 b = 0	a = 2 b = 3	a = 20 b = 0

Output:

a = 8

b = 0

a = 2

b = 9

a = 20

b = 0