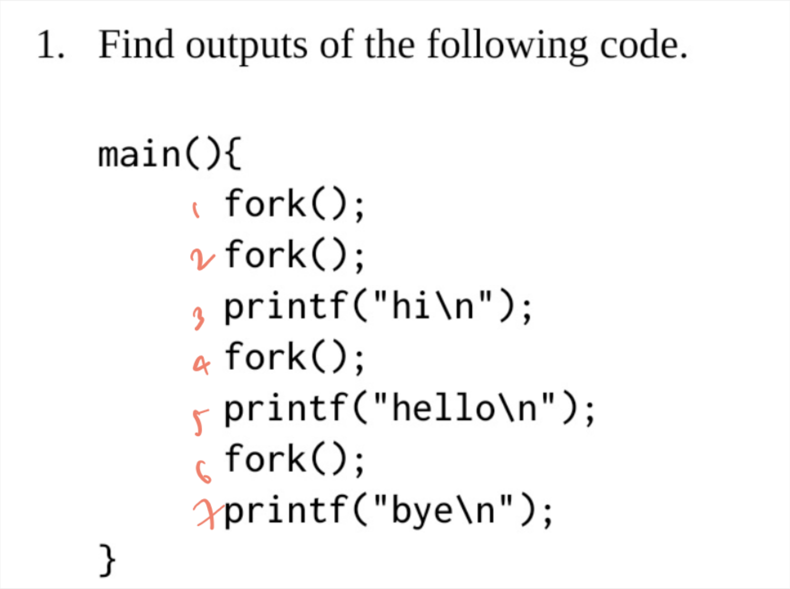
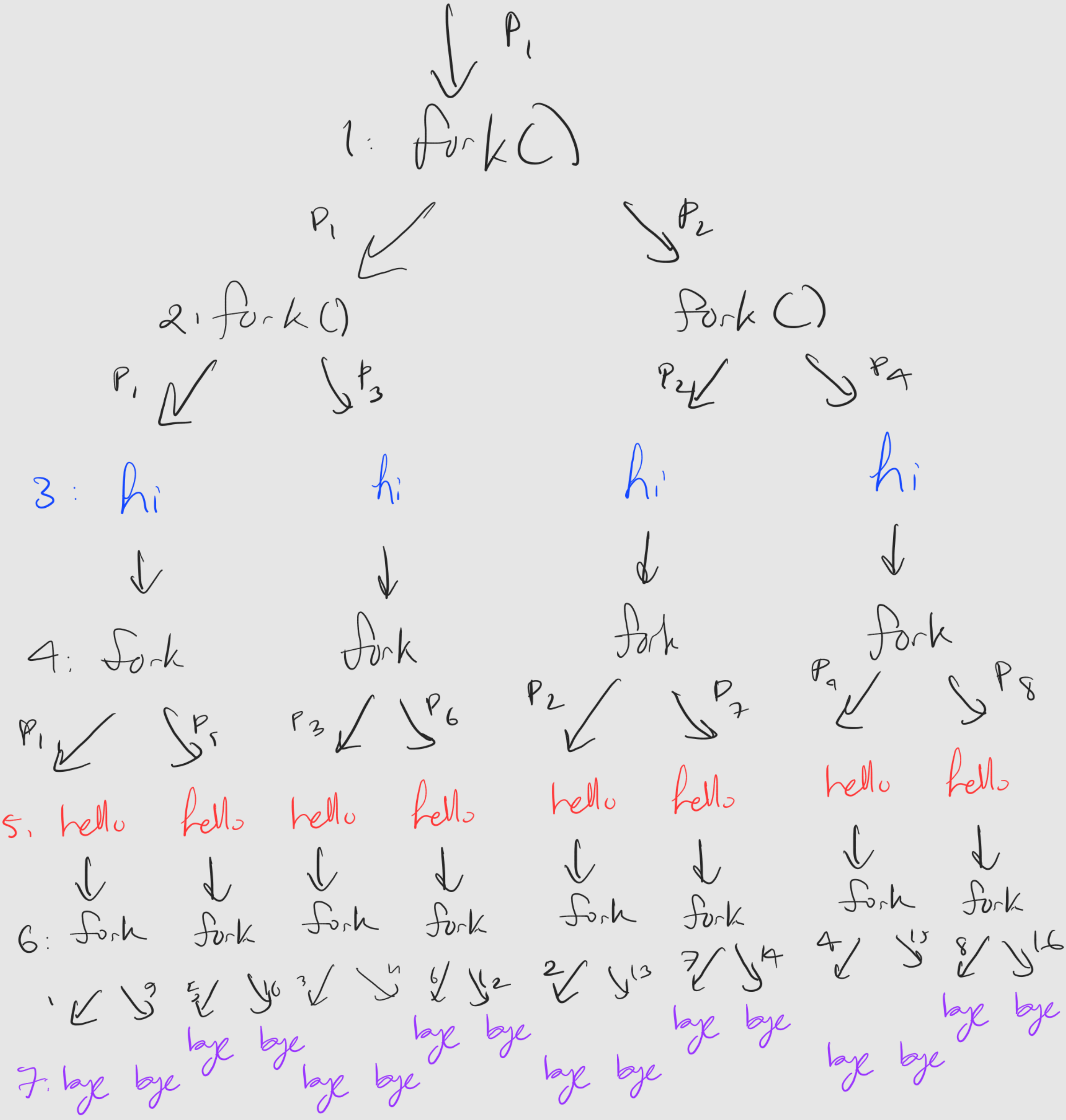


1. Find outputs of the following code.

```
main(){
      fork();
      fork();
      printf("hi\n");
      fork();
      printf("hello\n");
      fork();
      printf("bye\n");
}
```



hi : 4

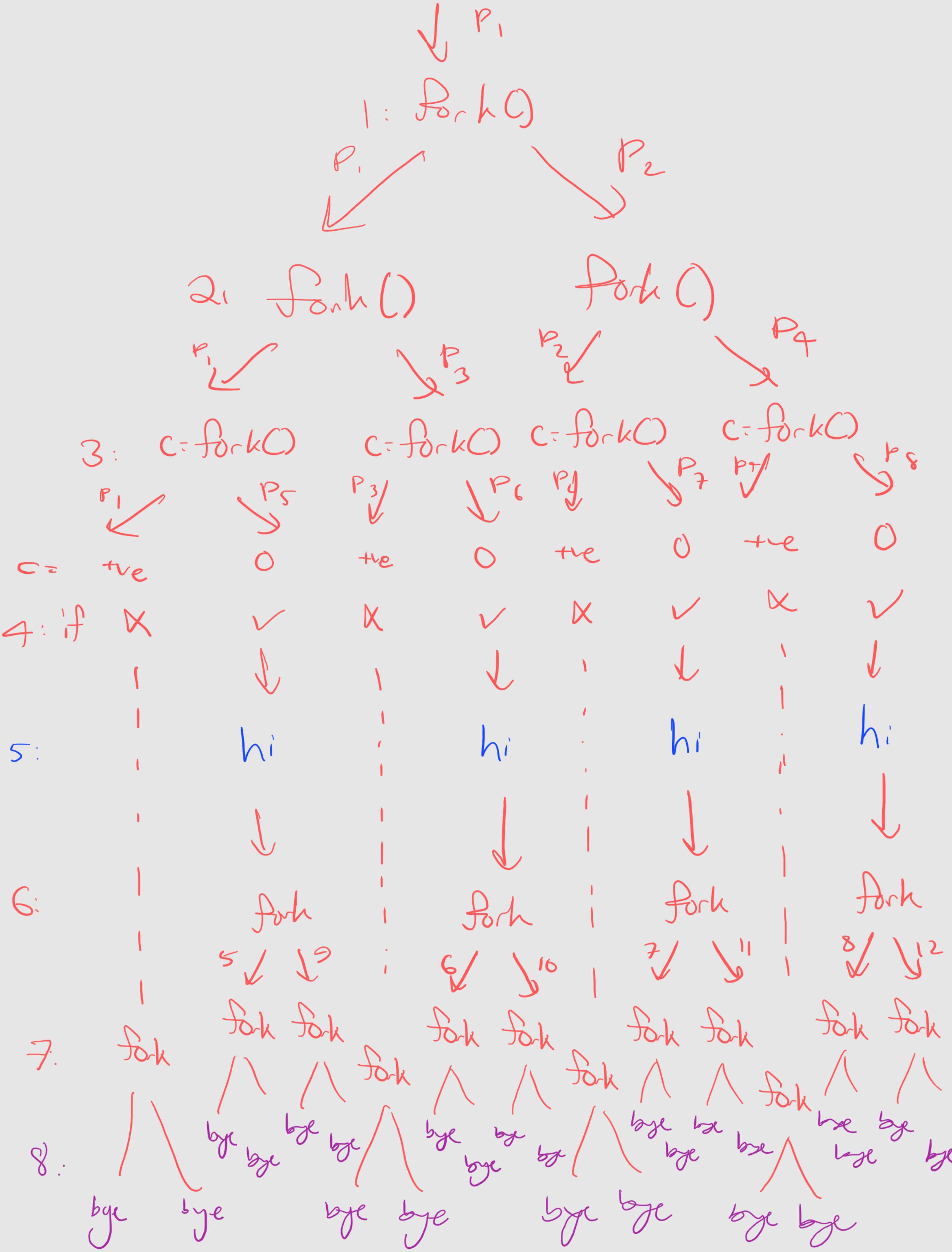
hello : 8

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
P2
P7
P4
P8
c=
+ve
0
+ve
0
+ve
0
+ve
0
4: if
X
✓
X
✓
X
✓
X
✓
5:
hi
hi
hi
hi
6:
fork
fork
fork
fork
5
9
6
10
7
11
8
12
7:
fork
fork
fork
fork
fork
fork
fork
fork
fork
fork
fork
fork
8:
bye
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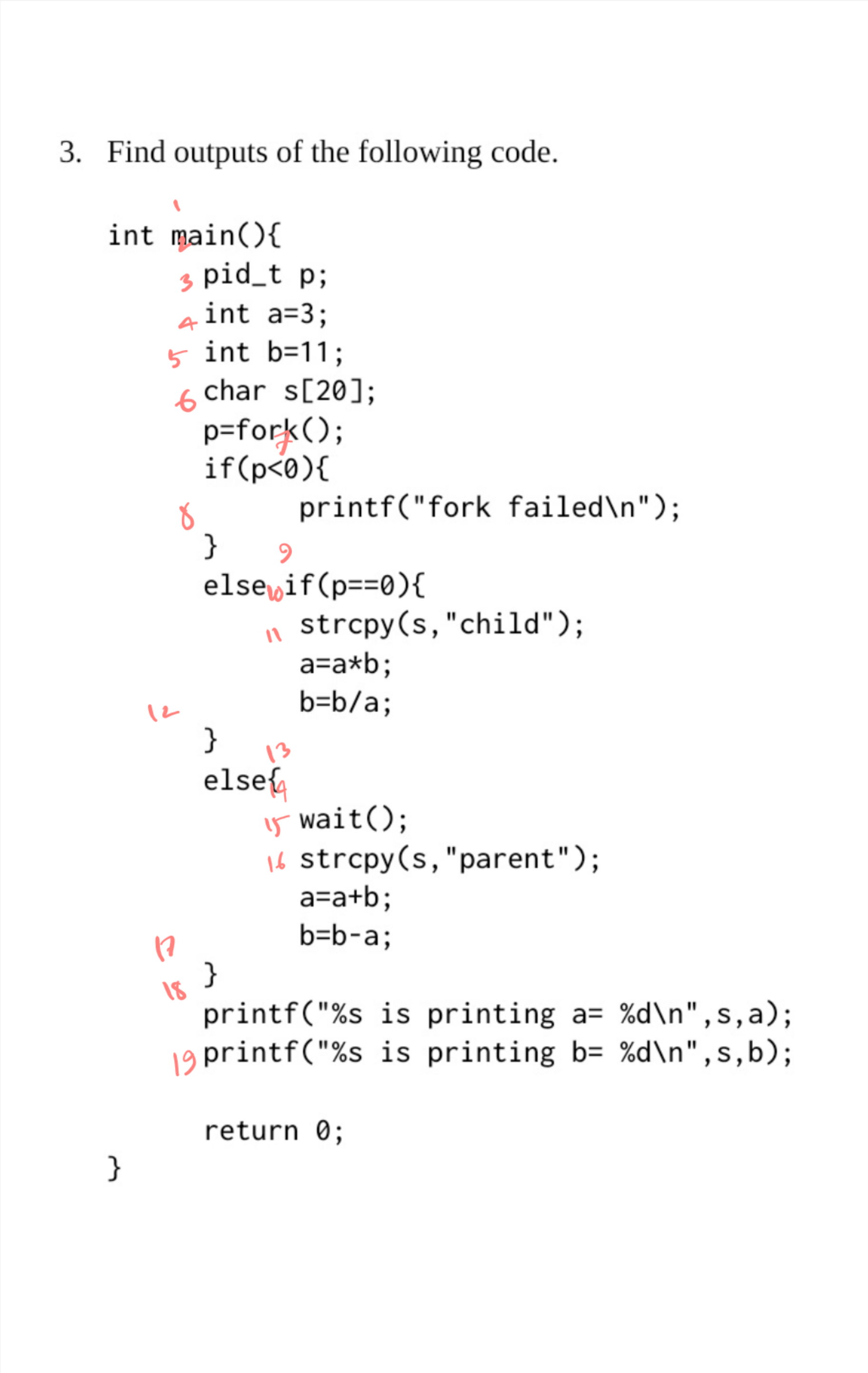
bye



3. Find outputs of the following code.

```
      1
int main(){
      3 pid_t p;
      4 int a=3;
      5 int b=11;
      6 char s[20];
        p=fork();  7
        if(p<0){
      8         printf("fork failed\n");
        }   9
        else 10 if(p==0){
             11 strcpy(s,"child");
                a=a*b;
                b=b/a;
   12   }    13
        else{ 14
             15 wait();
             16 strcpy(s,"parent");
                a=a+b;
                b=b-a;
   17   }
     18 printf("%s is printing a= %d\n",s,a);
     19 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	$a=8$ $b=0$	$a=2$ $b=9$	$a=20$ $b=0$

Output:

```
a = 8

b = 6

a = 2

b = 9

a = 20

b = 0
```