

# CSI 31 Review and Practice

## Topics:

1. Decision structures
2. Loops
3. Conditionals
4. Flowcharts
5. Functions
6. Structure charts  
(module hierarchy charts)

## Example 1

For the following piece of code:

```
a = int(input("enter an integer value:"))
b = int(input("enter an integer value:"))
c = int(input("enter an integer value:"))

d = b*b-4*a*c

if d > 0:
    print("two real roots")

elif d == 0:
    print("one real root")

else:
    print(" no real number roots")
```

Predict the output of the following input values

(a) 1, 8, -5      (b) 5, 4, 4      (c) 1, -6, 9      (d) 5, f, 9

if the numbers/letters will be entered one by one

## Example 1

For the following piece of code:

```
a = int(input("enter an integer value:"))
b = int(input("enter an integer value:"))
c = int(input("enter an integer value:"))
```

```
d = b*b-4*a*c
```

```
if d > 0:
    print("two real roots")
```

```
elif d == 0:
    print("one real root")
```

```
else:
    print(" no real number roots")
```

Predict the output of the following input values

(a) 1, 8, -5

(b) 5, 4, 4

(c) 1, -6, 9

(d) 5, f, 9

two real roots

no real number roots

one real root

the code will  
crash

## Example 2

Draw a flowchart for the following piece of code:

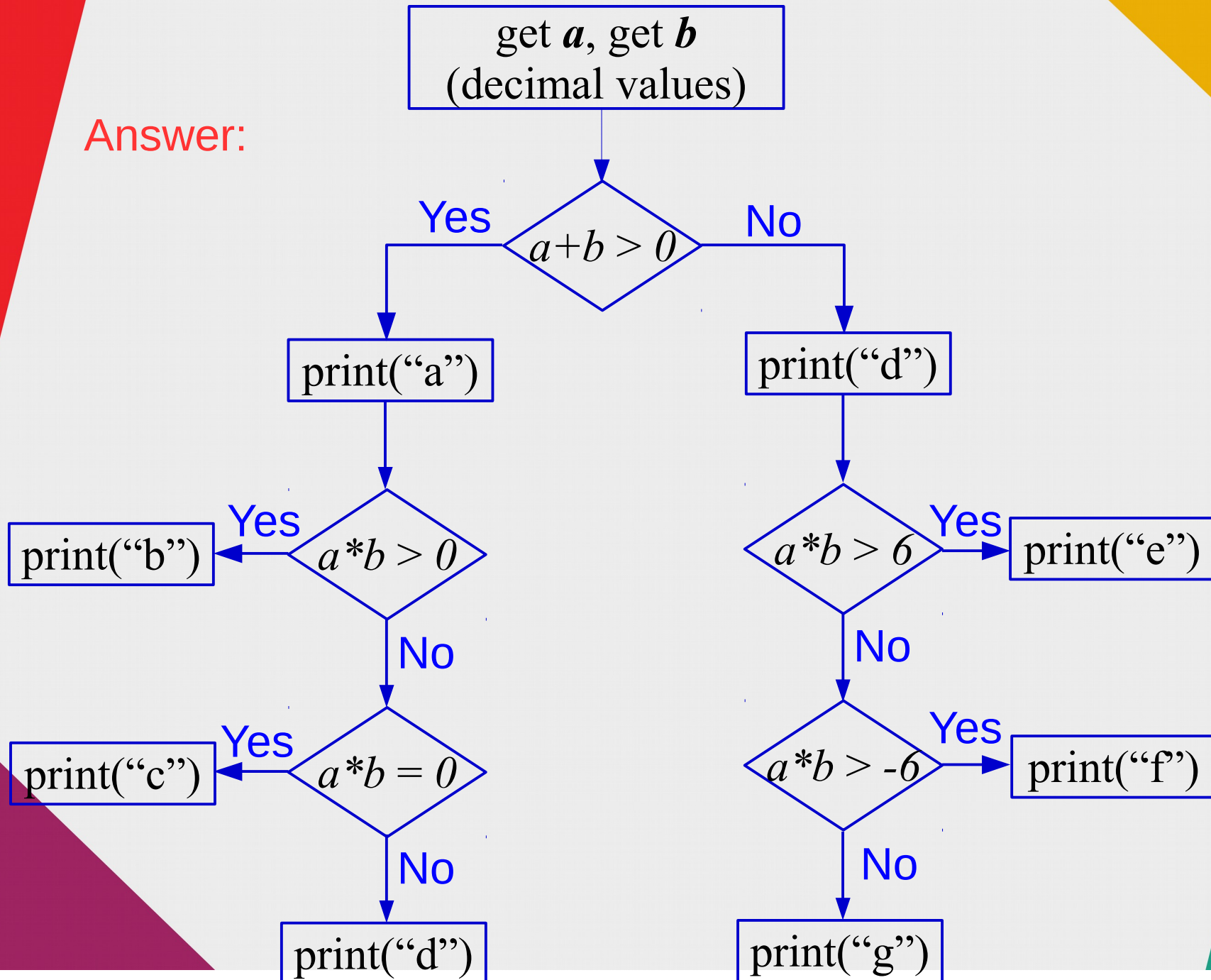
```
a = float(input("enter an decimal value:"))  
b = float(input("enter an decimal value:"))
```

```
if a+b > 10:  
    print("a")  
    if a*b > 0:  
        print("b")  
    elif a*b == 0:  
        print("c")  
    else:  
        print("d")
```

```
else:  
    print("d")  
    if a*b > 6:  
        print("e")  
    elif a*b < -6:  
        print("f")  
    else:  
        print("g")
```

## Example 2

Answer:



## Example 2-2

Draw a flowchart for the following piece of code:

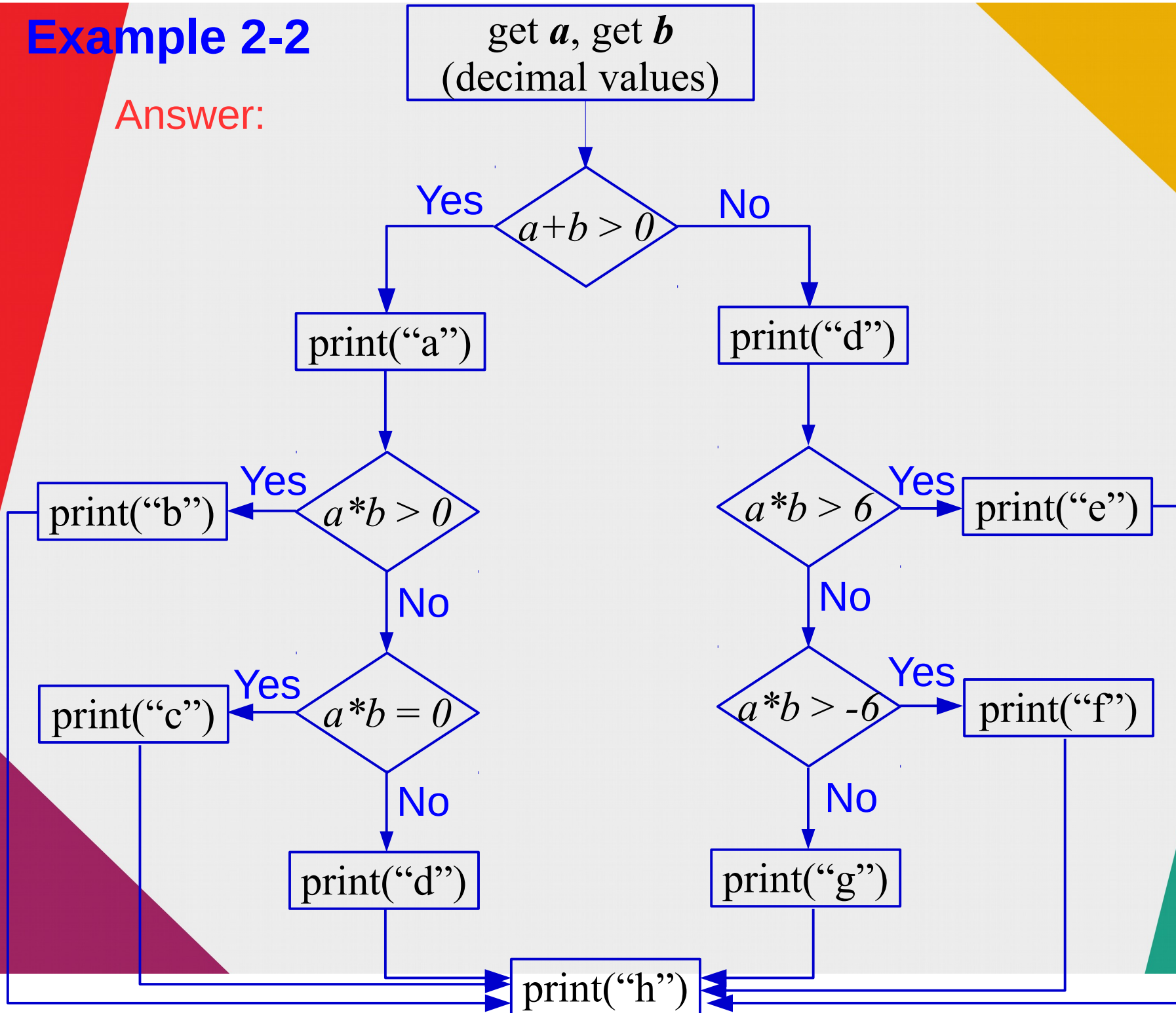
```
a = float(input("enter an decimal value:"))  
b = float(input("enter an decimal value:"))
```

```
if a+b > 10:  
    print("a")  
    if a*b > 0:  
        print("b")  
    elif a*b == 0:  
        print("c")  
    else:  
        print("d")
```

```
else:  
    print("d")  
    if a*b > 6:  
        print("e")  
    elif a*b < -6:  
        print("f")  
    else:  
        print("g")  
print("h")
```

## Example 2-2

Answer:



## Example 3

What does each of the following blocks of code displays in Python shell when run?

(a)

```
L = [1, 9, 2, 6, 9, 9, 5, 8, 3]
for i in L:
    if i == 9:
        print(1, end="")
    else:
        print(0, end="")
```

(b)

```
s = 28
while s > 8:
    if s >= 16:
        s = s // 2
    else:
        s += 3
    print(s)
```



## Example 3

What does each of the following blocks of code displays in Python shell when run?

(a)

```
L = [1, 9, 2, 6, 9, 9, 5, 8, 3]
for i in L:
    if i == 9:
        print(1, end="")
    else:
        print(0, end="")
```

Answers:

010011000

(b)

```
s = 28
while s > 8:
    if s >= 16:
        s = s // 2
    else:
        s += 3
print(s)
```

14  
17  
8

## Example 3

What does each of the following blocks of code displays in Python shell when run?

(c)

```
st = "jhkHFKod"  
s = ""
```

```
for i in range(0, len(st), 2):  
    s += st[i+1] + st[i]  
print(s)
```

(b)

```
m = 10  
s = 0  
while m > 0:  
    s += 2**(m%2)  
    m -= 1  
print(s)
```

## Example 3

What does each of the following blocks of code displays in Python shell when run?

(c)

```
st = "jhkHFKod"  
s = ""
```

```
for i in range(0, len(st), 2):  
    s += st[i+1] + st[i]  
print(s)
```

Answers:

(b)

```
m = 10  
s = 0  
while m > 0:  
    s += 2**(m%2)  
    m -= 1  
print(s)
```

hjHkKFdo

15

## Example 4

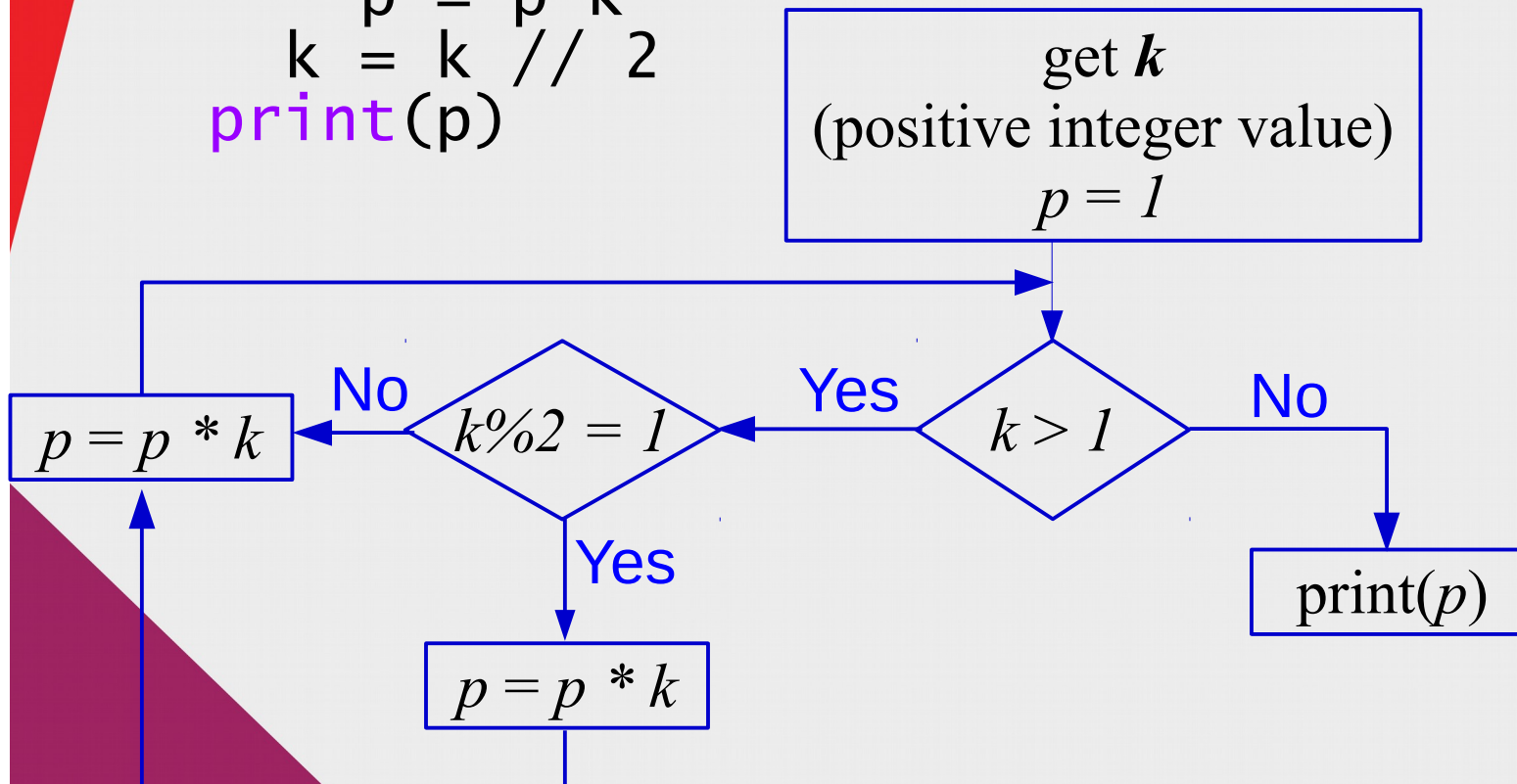
Draw the flowchart for the following code

```
k = int(input("Enter a positive integer  
greater 100:"))  
p = 1  
while k > 1:  
    if k % 2 == 0:  
        p = p*k  
        k = k // 2  
print(p)
```

## Example 4

Draw the flowchart for the following code

```
k = int(input("Enter a positive integer  
greater 100:"))  
p = 1  
while k > 1:  
    if k % 2 == 0:  
        p = p*k  
        k = k // 2  
    print(p)
```



## Example 5

What is wrong with the following code?

```
k = int(input("Enter an integer:"))
p = 1
while k > 1:
    if k % 2 == 0:
        p = p*k
        k = k - 1
    print(k)
print(p)
```

## Example 5

What is wrong with the following code?

```
k = int(input("Enter an integer:"))
p = 1
while k > 1:
    if k % 2 == 0:
        p = p*k
        k = k - 1
    print(k)
print(p)
```

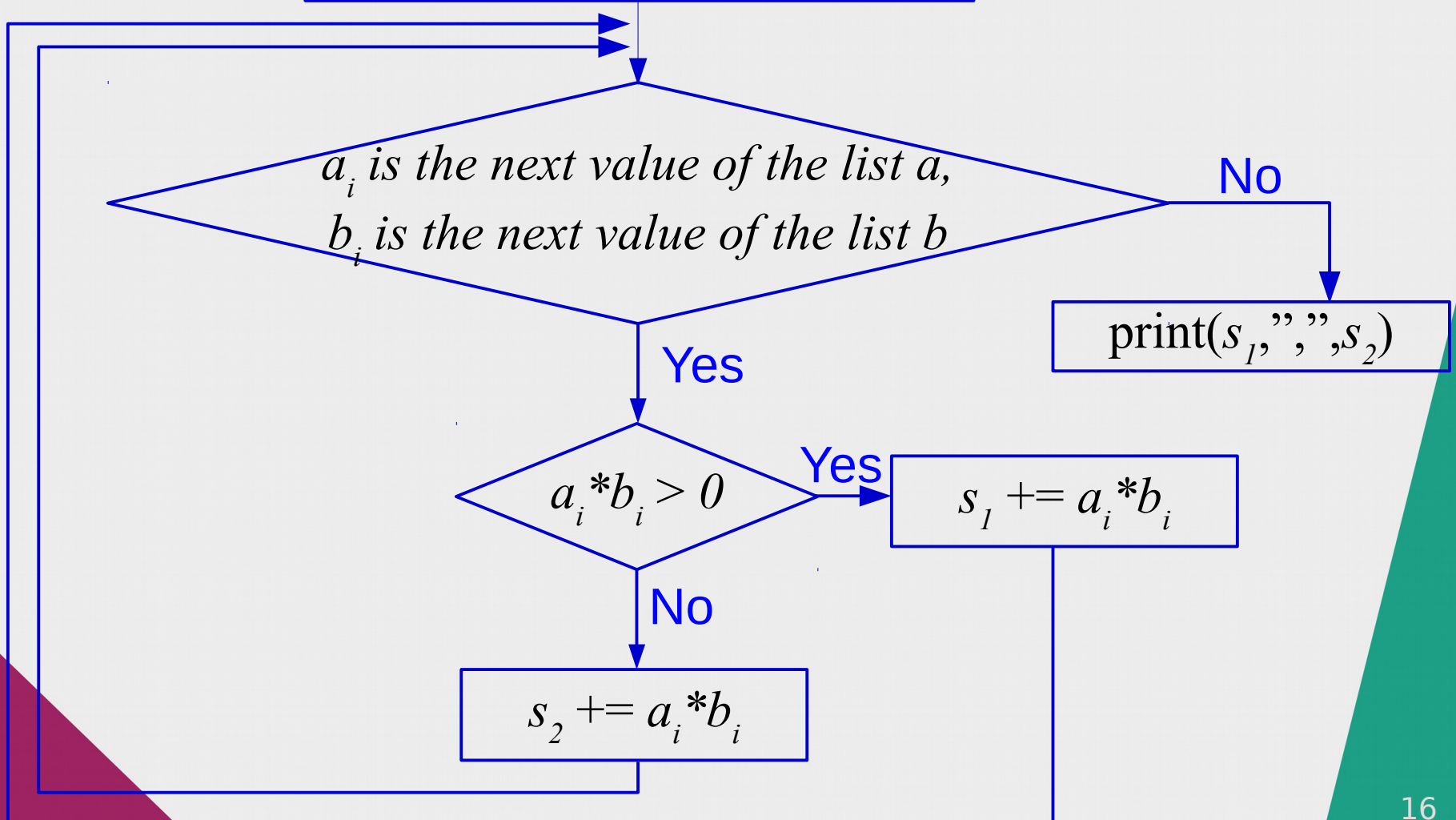
Answer:

If a user enters an odd value greater than 1, then we will get an infinite loop because k is decremented by one only for even ks.

## Example 6

Implement a procedure using the given flowchart:

$a$  is a list of decimal values  
 $b$  is a list of decimal values  
 $s_1 = 0$  and  $s_2 = 0$





## Example 6

Answer:

```
s1, s2 = 0, 0
for i in range(len(a)):
    value = a[i]*b[i]
    if value > 0:
        s1 += value
    else:
        s2 += value
print(s1, ", ", s2)
```

## Example 7

What does the following code print?

```
def f1(a,b):  
    return a+b  
  
def f2(a,b):  
    return a*b  
  
def f3(a,b):  
    if a > b:  
        return a  
    else:  
        return b  
  
def main():  
    a, b = 2, 7  
    print(f1(a,b))  
    print(f2(a,b))  
    print(f3(a,b))  
  
main()
```

## Example 7

What does the following code print?

```
def f1(a,b):  
    return a+b  
  
def f2(a,b):  
    return a*b  
  
def f3(a,b):  
    if a > b:  
        return a  
    else:  
        return b  
  
def main():  
    a, b = 2, 7  
    print(f1(a,b))  
    print(f2(a,b))  
    print(f3(a,b))  
  
main()
```

Answer:

9  
14  
7

## Example 8

What does the following code print?

```
def g1(a, b):  
    a.append(5)  
    b = b + " hello"  
    print("a=", a)  
    print("b=", b)
```

```
def main():  
    x = [1, 2, 9]  
    y = "my"  
    print("x=", x)  
    print("y=", y)  
    g1(x, y)  
    print(x)  
    print(y)
```

```
main()
```

## Example 8

What does the following code print?

```
def g1(a,b):  
    a.append(5)  
    b = b + " hello"  
    print("a=",a)  
    print("b=",b)  
  
def main():  
    x = [1,2,9]  
    y = "my"  
    print("x=",x)  
    print("y=",y)  
    g1(x,y)  
    print(x)  
    print(y)  
  
main()
```

Answer:

```
x= [1, 2, 9]  
y= my  
a= [1, 2, 9, 5]  
b= my hello  
[1, 2, 9, 5]  
my
```

## Example 9

Given a program below draw its structure chart.

```
def p():
    print("Bonjour madame.")
    print("Comment allez vous?")

def g():
    a = int(input("Enter a number:"))
    return abs(a)

def m():
    s = input("Enter a sentence:")
    return s

def o(x,y):
    """ x in a positive integer, y is a string """
    return(y*x)

def main():
    p()
    num = g()
    phrase = m()
    print(o(num,phrase))

main()
```

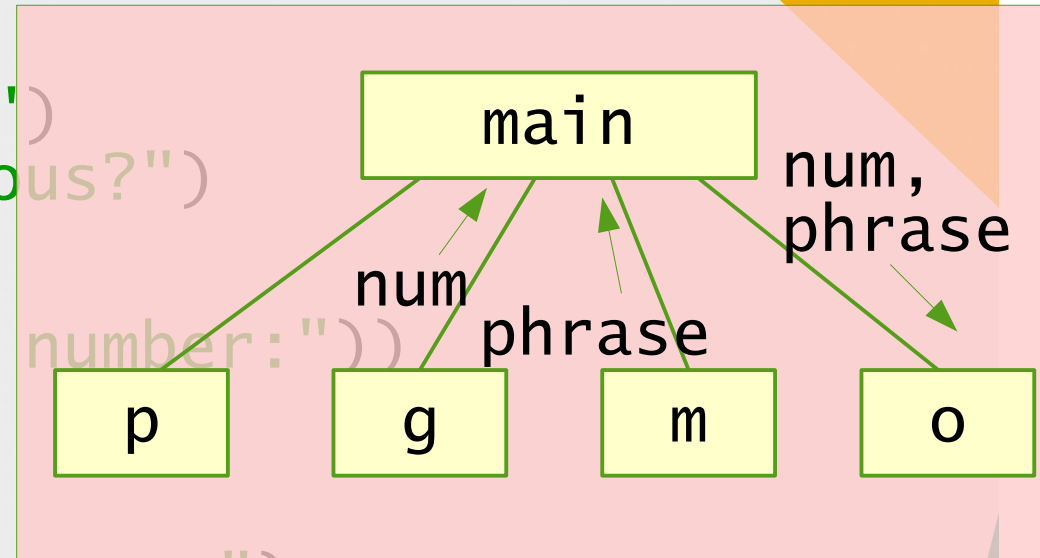
## Example 9

Given a program below draw its structure chart.

```
def p():  
    print("Bonjour madame.")  
    print("Comment allez vous?")  
  
def g():  
    a = int(input("Enter a number:"))  
    return abs(a)  
  
def m():  
    s = input("Enter a sentence:")  
    return s  
  
def o(x,y):  
    """ x in a positive integer, y is a string """  
    return(y*x)
```

```
def main():  
    p()  
    num = g()  
    phrase = m()  
    print(o(num,phrase))
```

```
main()
```



## Example 10

What will the following code print?

```
L = ["hop", "crawl", "jump", "walk",  
"slide", "tiptoe"]
```

```
D = ""
```

```
for i in range(4):  
    index = (i+len(L[i]))%6  
    D = D + "I " + L[index] + ", then "  
D += "I stop!"  
print(D)
```



## Example 10

What will the following code print?

```
L = ["hop", "crawl", "jump", "walk",  
"slide", "tiptoe"]
```

```
D = ""
```

```
for i in range(4):  
    index = (i+len(L[i]))%6  
    D = D + "I " + L[index] + ", then "  
D += "I stop!"  
print(D)
```

Answer:

I walk, then I hop, then I hop, then I crawl, then I stop!

## Example 11

What dictionary **D** does the following code generate?

```
L = ["hop", "crawl", "jump", "walk",  
     "slide", "tiptoe"]
```

```
D = {}
```

```
for i in range(6):  
    D[i*i] = L[i]
```

## Example 11

What dictionary **D** does the following code generate?

```
L = ["hop", "crawl", "jump", "walk",  
     "slide", "tiptoe"]  
D = {}
```

```
for i in range(6):  
    D[i*i] = L[i]
```

Answer:

```
0: 'hop'  
1: 'crawl'  
4: 'jump'  
16: 'slide'  
25: 'tiptoe'  
9: 'walk'
```