National 5 Computing Homework

Computational Thinking

Topic 4 - IF (Making Decisions)

Name -

Grade -   / 28

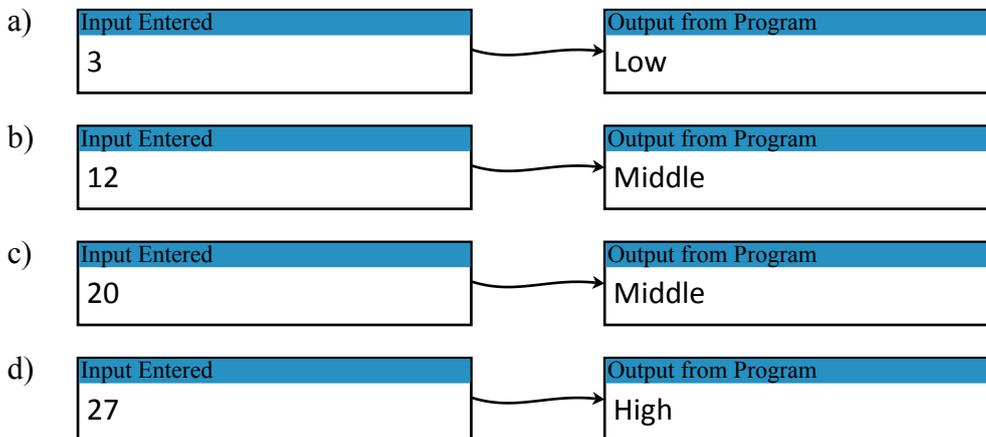Feedback

Without the ability to make decisions a computer program would not be able to change how it responds to input. Conditions (for example - num>=25) are used to decide how the program will respond.

In the following questions you will be asked to predict what the output from each program will be from a variety of different inputs.

Example program:
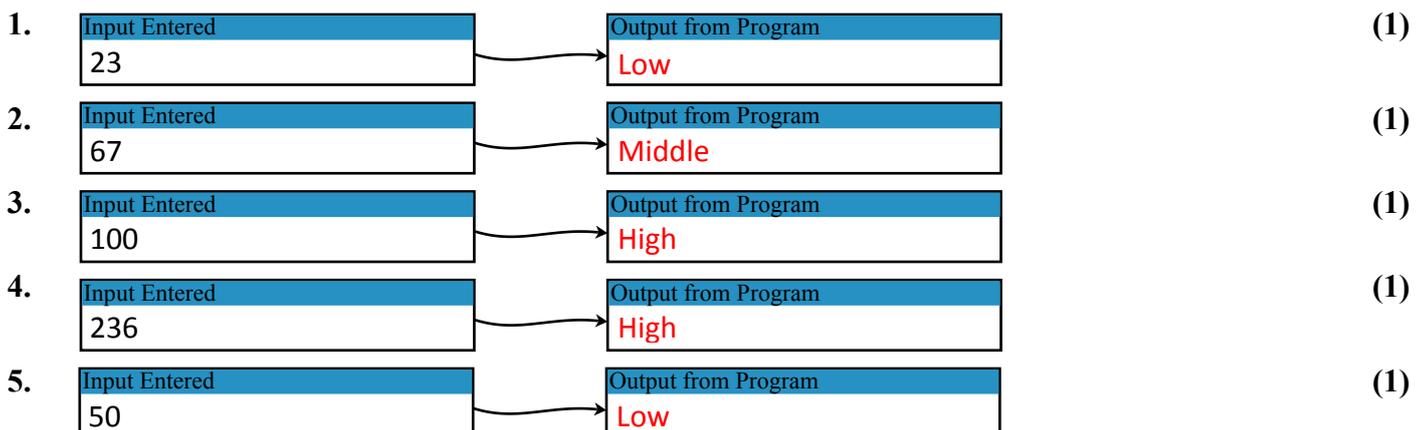```
number = int(input("Please enter an integer"))
if number < 10:
    print("Low")
if number >= 10 and number <= 20:
    print("Middle")
if number > 20:
    print("High")
```

#indented lines are only if the above condition is true

a)
| Input Entered | Output from Program |
|---|---|
| 3 | Low |

b)
| Input Entered | Output from Program |
|---|---|
| 12 | Middle |

c)
| Input Entered | Output from Program |
|---|---|
| 20 | Middle |

d)
| Input Entered | Output from Program |
|---|---|
| 27 | High |

**Program 1:**
```
number = int(input("Please enter an integer"))
if number <= 50:
    print("Low")
if number > 50 and number < 100:
    print("Middle")
if number >= 100:
    print("High")
```

1.
| Input Entered | Output from Program |
|---|---|
| 23 | Low |
(1)

2.
| Input Entered | Output from Program |
|---|---|
| 67 | Middle |
(1)

3.
| Input Entered | Output from Program |
|---|---|
| 100 | High |
(1)

4.
| Input Entered | Output from Program |
|---|---|
| 236 | High |
(1)

5.
| Input Entered | Output from Program |
|---|---|
| 50 | Low |
(1)

**Program 2:**

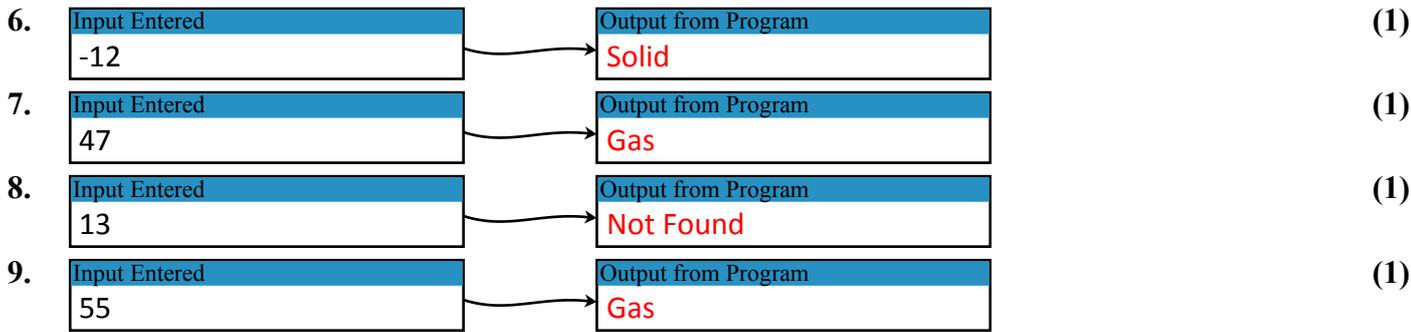```
temp = float(input("Please enter a temperature"))
if temp >= -273 and temp <= 12:
    print("Solid")
elif temp >13 and temp < 47:           #elif in Python means 'else if'
    print("Liquid")
elif temp >= 47:
    print("Gas")
else:                                  #if none of the conditions above
    print("Not Found")                   are true, the 'else' is used
```

6.

Input Entered	Output from Program
-12	Solid

(1)

7.

Input Entered	Output from Program
47	Gas

(1)

8.

Input Entered	Output from Program
13	Not Found

(1)

9.

Input Entered	Output from Program
55	Gas

(1)

10. Which of the above questions (5,6,7 or 8) highlights an error in the logic of the program? **(1)**

   8

State how would you fix the program? **(1)**

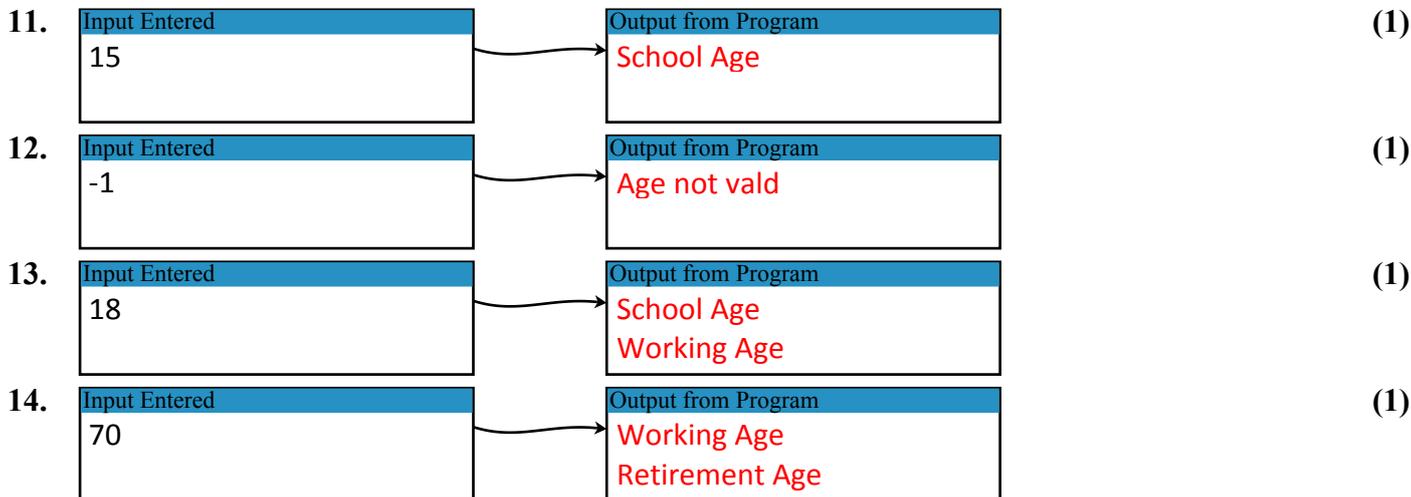 Change line 4 to: elif temp >**12** and temp <47

Program 3:

```
age = int(input("Please enter your age"))
if age < 0 or age > 120:               #with an 'or' only one
    print("Age not valid")               condition has to be true
elif age >= 0 and age <= 18:
    print("School age")
elif age >= 16 and age <= 70:
    print("Working age")
elif age > 65:
    print("Retirement age")
else:
    print("Not Found")
```

Note - for this program there may sometimes be two outputs generated from the one input.

11.

Input Entered	Output from Program
15	School Age

(1)

12.

Input Entered	Output from Program
-1	Age not vald

(1)

13.

Input Entered	Output from Program
18	School Age Working Age

(1)

14.

Input Entered	Output from Program
70	Working Age Retirement Age

(1)

15. Assuming an integer is entered as input, explain why can the output never be "Not Found"? **(1)**

For any integer that is entered, one of the conditions in the if statement must be true. This means the else is not required as it will never be used.
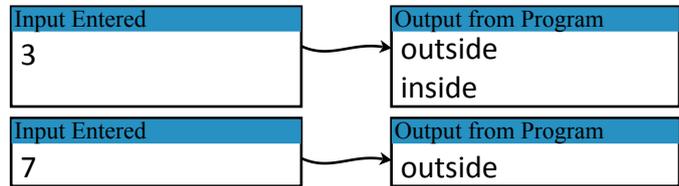
It's possible to put 'if' statements inside each other. In programming, this is called nesting.

Example program:
```
test = int(input("Please enter an integer"))
if test >= 0 and test <= 12:                    #outside if statement
    print("outside")
    if test >= 0 and test < 4:                  #nested if statement
        print("inside")                         #two levels of indentation
```
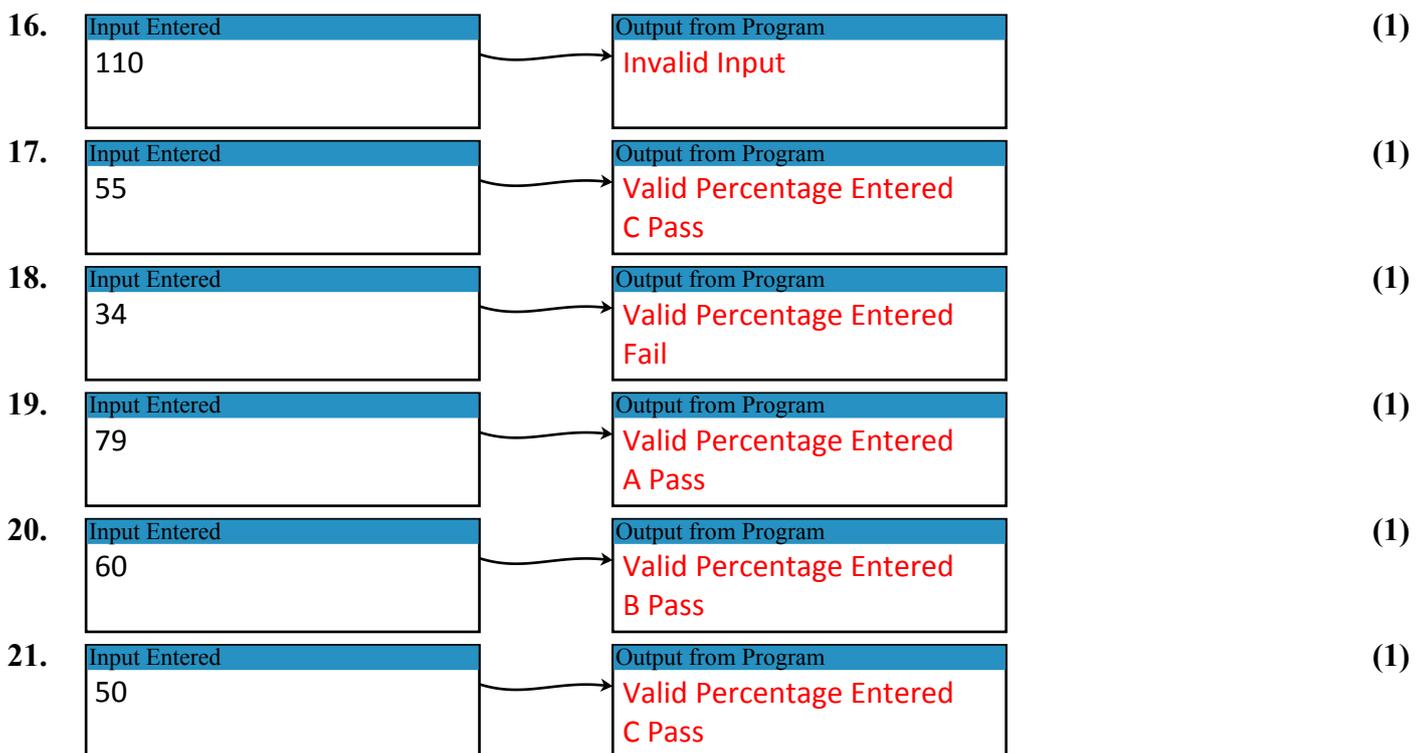
The conditions of a nested if are only checked if the outside if conditions are true:

Input Entered		Output from Program
3	→	outside
		inside

Input Entered		Output from Program
7	→	outside

Program 4:
```
percentage = int(input("Please enter a percentage between 0 and 100"))
if percentage < 0 or percentage > 100:
    print("Invalid Input")
elif percentage >= 0 and percentage < 100:
    print("Valid Percentage Entered")
    if percentage >= 0 and percentage < 50:
        print("Fail")
    elif percentage >= 50 and percentage < 60:
        print("C Pass")
    elif percentage >= 60 and percentage < 70:
        print("B Pass")
    else:
        print("A Pass")
```

16.

Input Entered		Output from Program	(1)
110	→	Invalid Input	

17.

Input Entered		Output from Program	(1)
55	→	Valid Percentage Entered	
		C Pass	

18.

Input Entered		Output from Program	(1)
34	→	Valid Percentage Entered	
		Fail	

19.

Input Entered		Output from Program	(1)
79	→	Valid Percentage Entered	
		A Pass	

20.

Input Entered		Output from Program	(1)
60	→	Valid Percentage Entered	
		B Pass	

21.

Input Entered		Output from Program	(1)
50	→	Valid Percentage Entered	
		C Pass	

Program 5:   The following program calculates the postage cost of parcels depending on their value and their weight.

```
value = float(input("Please enter the value of your item"))
weight = float(input("Please enter the weight of your item in kilograms"))
if value <= 0:
    print("Invalid value")
    postage = 0
if weight >= 0 and weight < 2:
    if value > 0 and value < 50:
        postage = 1.50
    if value >= 50 and value < 150:
        postage = 2.75
    if value >= 150:
        postage = 5.50
elif weight >= 2 and weight < 10:
    if value > 0 and value < 50:
        postage = 2.50
    if value >= 50 and value < 150:
        postage = 4.40
    if value >= 150:
        postage = 8.35
elif weight >= 10 and weight < 25:
    if value > 0 and value < 50:
        postage = 7.55
    if value >= 50 and value < 150:
        postage = 12.30
    if value >= 150:
        postage = 15.00
else:
    postage = 25
print(postage)
```

Calculate the postage for each of the inputs entered in the program.

22. Value = 62   Postage = <u>2.75</u>   **(1)**
      Weight = 1.5

23. Value = 0   Postage = <u>0 (Invalid Value)</u>   **(1)**
      Weight = 2.2

24. Value = 172   Postage = <u>15.00</u>   **(1)**
      Weight = 19

25. Value = 250   Postage = <u>25.00</u>   **(1)**
      Weight = 32.5

26. Value = 34   Postage = <u>2.50</u>   **(1)**
      Weight = 2.5

27. Value = 50   Postage = <u>12.30</u>   **(1)**
      Weight = 10