MODULE M PROGRAMMING · M7

Boolean operators AND, OR and NOT in code

Original practice questions · 22 marks · ~25 minutes · Cambridge 0478 syllabus 8.1.4(f), 7.8, 7.9

Name _____ Date _____

Instructions. Answer all questions in the spaces provided. The marks for each part are shown in brackets [ ]. The total for this worksheet is **22 marks**. Write all algorithms and conditions in pseudocode. All data on this sheet is made up.

1

Total: 3 marks

(a) Complete the table by writing the logical operator (`AND`, `OR` or `NOT`) that matches each description. **[3]**

Description	Logical operator
The result is TRUE when either one or both of the two conditions are TRUE.	
The result is TRUE only when both conditions are TRUE.	
The result is the opposite of the single Boolean value it is applied to.	

2

Total: 3 marks

A greenhouse controller has just carried out these statements:

```
Humidity ← 64
FanOn ← TRUE
Level ← 3
```

(a) Complete the table to show whether each expression evaluates to TRUE or FALSE. **[3]**

Expression	TRUE or FALSE
`(Humidity > 60) AND (Level = 3)`	
`(NOT FanOn) OR (Level > 5)`	
`NOT ((Humidity >= 64) AND FanOn)`	

3 **Total: 4 marks**

The temperature setting of a cold-store unit is stored as an integer in the variable `Setting`. A setting is accepted only if it is from −25 to −15 inclusive.

(a) Write a condition, in pseudocode, that is TRUE when the setting is accepted. **[2]**

(b) Write a condition, in pseudocode, using the **OR** operator, that is TRUE when the setting is **not** accepted. **[2]**

4 **Total: 6 marks**

A bus station display uses this algorithm to choose which timetable to show. It should show:

- the weekend timetable when `Day` is `"Sat"` or `"Sun"`
- on other days, the peak timetable when `Hour` is from 6 to 9 inclusive, and the off-peak timetable at all other hours.

The algorithm contains **two** errors.

```
01 INPUT Day
02 INPUT Hour
03 IF Day = "Sat" AND Day = "Sun"
04   THEN
05     OUTPUT "Weekend timetable"
06   ELSE
07     IF Hour >= 6 AND <= 9
08       THEN
09         OUTPUT "Peak timetable"
10       ELSE
11         OUTPUT "Off-peak timetable"
12     ENDIF
13 ENDIF
```

(a) Identify the line number of each error and suggest a correction. **[4]**

Error 1 Line number ..... Correction

Error 2 Line number ..... Correction

(b) Explain why, before it is corrected, the algorithm never outputs `Weekend timetable`. **[2]**

5 **Total: 6 marks**

A survey drone checks whether it is safe to take off. The BOOLEAN variable `Raining` has already been set to TRUE or FALSE by a sensor.

(a) Write an algorithm using pseudocode to: **[6]**

- input the battery charge as a whole number, and the wind speed
- output `Take-off allowed` if the battery charge is 40 or more, the wind speed is less than 30 **and** it is **not** raining
- otherwise output `Take-off blocked`.

You do not need to declare any variables.

Total for this worksheet: 22 marks