Boolean logic

Task 1 .

A digital sensor returns a reading that is either true or false.

You have a digital light sensor and you name its reading light. This reading is true when the light level exceeds a certain threshold and false otherwise.

The table below contains the different possible values for the light sensor reading. For each of these values, fill in the table with the corresponding values for the logical expression not light.

|  |  |
| --- | --- |
| light sensor reading **light** | value of expression **not light** |
| false |  |
| true |  |

Task 2 .

The logical variable fruit is true when a diet includes fruit and false otherwise. The logical variable veg is true when a diet includes vegetables and false otherwise.

The expression below is a simplistic indicator of a healthy diet:

fruit **or** veg

The table below contains different combinations of the possible values for fruit and veg. For each of these combinations, fill in the table with the corresponding values for the logical expression fruit **or** veg.

|  |  |  |
| --- | --- | --- |
| diet includes fruit **fruit** | diet includes vegetables  **veg** | value of expression  **fruit** **or** **veg** |
| false | false |  |
| false | true |  |
| true | false |  |
| true | true |  |

Task 3 .

You come across a strange machine. It has a red button, a green button, and a blue light.

You try pressing different combinations of the two buttons and make a table indicating which combinations result in the blue light being turned on.

|  |  |  |
| --- | --- | --- |
| red button pressed **red** | green button pressed **green** | blue light is on |
| true | true | true |
| true | false | false |
| false | true | false |
| false | false | false |

Write a logical expression that describes when the blue light is on. The expression should involve the red and green logical variables and it should be true when the blue light is on.

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Explorer task .

A digital sensor returns a reading that is either true or false.

You have a digital light sensor and you name its reading light. This reading is true when the ambient light level exceeds a certain threshold and false otherwise.

You have a digital motion sensor and you name its reading motion. This reading is true when motion is detected and false otherwise.

You want a security light to be turned on when motion is detected and there is no ambient light.

Write a logical expression that involves the sensor readings light and motion and is true when the security light should be turned on.

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