

## CS128 – Homework #6

### Nested Conditionals and Compound Boolean Expressions using Logical Operators and, or, not

#### Task 1a – Report Card

You must use compound Boolean expressions that include logical operators (i.e. and, or, not) to implement this program.

**Do not use nested conditional statements** (if contained within if or else).

Your program should consist of a single if/else statement.

The program should read in 5 numbers to represent the frequency of letters grades on a report card, i.e. how many As, Bs, Cs, Ds, and Fs. The reward is calculated as \$20 for each A and \$5 for each B. The program should indicate the reward or inform the user to study harder.

RULE: To receive a reward, a student must have 0 Fs and no more than 1 D.

A:3 B:2 C:0 D:0 F:0 You get \$70	A:1 B:2 C:1 D:1 F:0 You get \$30	A:2 B:1 C:0 D:0 F:1 Study harder	A:3 B:1 C:0 D:2 F:0 Study harder
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#### Task 1b – Report Card

Implement the same program as task#1a, however you must use nested conditionals.

**Do not use the logical operators and, or, not.**

Test your program with a similar set of input values as task#1a to confirm your implementation.

### Task2a – Report Card

The rule for receiving a reward has changed. Implement a similar program as task1a, using only logical operators and no nested conditionals.

RULE: To receive a reward, a student must have 0 Fs, 0 Ds, and no more than 2 Cs .

A:2 B:1 C:0 D:0 F:1 Study harder	A:1 B:1 C:1 D:1 F:0 Study harder	A:1 B:1 C:3 D:0 F:0 Study harder	A:2 B:1 C:2 D:0 F:0 You get \$45
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### Task 2b – Report Card

Implement the same program as task#2a, however you must use nested conditionals.

**Do not use the logical operators and, or, not.**

Test your program with a similar set of input values as task#2a to confirm your implementation.

### Task3a – Report Card

The rule for receiving a reward has changed. Use only logical operators and no nested conditionals.

RULE: To receive a reward, a student must have at least 2As or at least 4 Bs . The number of Cs, Ds, and Fs does not matter.

A:2 B:1 C:0 D:1 F:1 You get \$45	A:0 B:4 C:1 D:0 F:1 You get \$20	A:3 B:5 C:0 D:0 F:0 You get \$85	A:1 B:3 C:0 D:0 F:0 Study harder
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### Task 3b – Report Card

Implement the same program as task#3a, however you must use a chained non-nested conditional (if/elif/else).

**Do not use the logical operators and, or, not.**

Test your program with a similar set of input values as task#3a to confirm your implementation.

#### Task4a – Report Card

The rule for receiving a reward has changed. Use only logical operators and no nested conditionals.

RULE: To receive a reward, a student must have no Fs. They must also have at least 2As or at least 4 Bs .  
The number of Cs, Ds, and Fs does not matter.

A:2 B:1 C:0 D:0 F:1 Study harder	A:1 B:5 C:0 D:0 F:1 Study harder	A:2 B:0 C:1 D:1 F:0 You get \$40	A:0 B:4 C:0 D:0 F:0 You get \$20	A:3 B:5 C:1 D:1 F:0 You get \$85
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#### Task 4b – Report Card

Implement the same program as task#4a, however you must use a nested conditional.

**Do not use the logical operators and, or, not.**

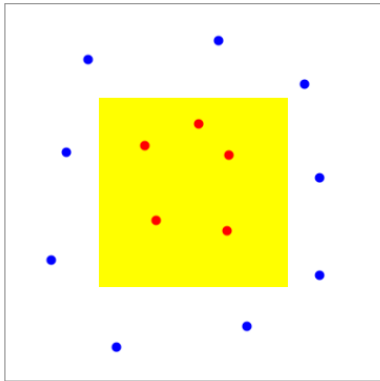
Test your program with a similar set of input values as task#4a to confirm your implementation.

### Task5a – Using the “and” logical operator

**NOTE:** **Do not** use operator chaining  $a < b < c$ . Use separate relational expressions joined by a logical operator such as:  $a < b$  and  $b < c$ .

The starter code draws a framed rectangle around the canvas with a filled yellow rectangle in the center. Implement the `handle_mouse_down` function to draw a red circle when the mouse is clicked within the area of the yellow rectangle, and a blue circle is clicked outside of it.

**NOTE:** Implement this task using only the logical operator “**and**” to test if the mouse click is within the area of the yellow rectangle. Do not use the logical operators “or” or “not”. Do not use nested conditionals. Your function should use a single non-nested if/else.



### Task5b – Using the “or” logical operator

Duplicate the code from task5a, but update the conditional test to use only the logical operator “**or**” to test if the mouse click occurs outside of the area of the yellow rectangle. **HINT:** Use the “not” operator to negate the boolean expression from task5a, then apply DeMorgan’s law to simplify the expression. Flip the color assignment between the if and else branches (blue if outside the yellow area, otherwise red).

### Task5c – Using a chained conditional

Duplicate the code from task5b, but implement the task without the use of any logical operators and, or, not. Convert the solution from task5b into a non-nested chained conditional statement if/elif/.....

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