COMP 141

if-elif-else, and/or

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Announcements

- Reminders:
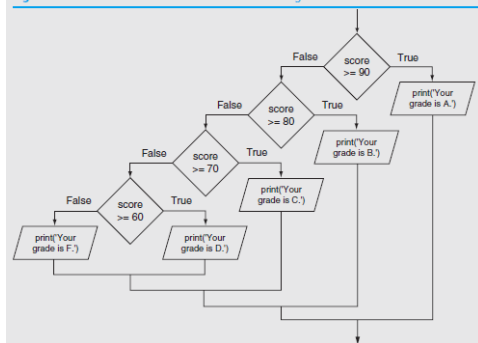 - Program 1 due tomorrow night by 11:55pm

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Practice

Write a program that prompts a user for his or her age and prints out whether or not they are (legally) allowed to drink alcohol.

Figure 4-17 Nested decision structure to determine a grade

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9/6/2017

Slide 5

```
# This program gets a numeric test score from the
# user and displays the corresponding letter grade.

# Constants for the grade thresholds
A_SCORE = 90
B_SCORE = 80
C_SCORE = 70
D_SCORE = 60

# Get a test score from the user.
score = int(input('Enter your test score: '))

# Determine the grade.
if score >= A_SCORE:
    print('Your grade is A.')
else:
    if score >= B_SCORE:
        print('Your grade is B.')
    else:
        if score >= C_SCORE:
            print('Your grade is C.')
        else:
            if score >= D_SCORE:
                print('Your grade is D.')
            else:
                print('Your grade is F.')
```

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Slide 6

The `if-elif-else` Statement

- **`if-elif-else` statement:** special version of a decision structure
  - Makes logic of nested decision structures simpler to write
    - Can include multiple `elif` statements
  - Syntax:
    ```
    if condition1:
        statements
    elif condition2:
        statements
    else:
        statements
    ```

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Slide 7

```
# This program gets a numeric test score from the
# user and displays the corresponding letter grade.
# It is equivalent to the program in the previous slide

# Constants for the grade thresholds
A_SCORE = 90
B_SCORE = 80
C_SCORE = 70
D_SCORE = 60

# Get a test score from the user.
score = int(input('Enter your test score: '))

# Determine the grade.
if score >= A_SCORE:
    print('Your grade is A.')
elif score >= B_SCORE:
    print('Your grade is B.')
elif score >= C_SCORE:
    print('Your grade is C.')
elif score >= D_SCORE:
    print('Your grade is D.')
else:
    print('Your grade is F.')
```

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Slide 8

Logical Operators

- **Logical operators:** operators that can be used to create complex Boolean expressions
  - **and** operator and **or** operator: binary operators, connect two Boolean expressions into a compound Boolean expression
  - **not** operator: unary operator, reverses the truth of its Boolean operand

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The and Operator

```
if _____ and _____ :
    # do something
else:
    # do something else
```

Both individual tests must be **True** to make the entire if statement **True**.

Truth table for the and operator

Expression	Value of the Expression
false and false	false
false and true	false
true and false	false
true and true	true

The or Operator

```
if _____ or _____ :
    # do something
else:
    # do something else
```

Either (or both) individual tests must be **True** to make the entire if statement **True**.

Truth table for the or operator

Expression	Value of the Expression
false and false	false
false and true	true
true and false	true
true and true	true

Short-Circuit Evaluation

- **Short circuit evaluation:** deciding the value of a compound Boolean expression after evaluating only one sub expression
  - Performed by the **or** and **and** operators
    - For **or** operator: If left operand is true, compound expression is true. Otherwise, evaluate right operand
    - For **and** operator: If left operand is false, compound expression is false. Otherwise, evaluate right operand

The not Operator

- Takes a Boolean expression as operand and reverses its logical value
  - Sometimes it may be necessary to place parentheses around an expression to clarify to what you are applying the not operator
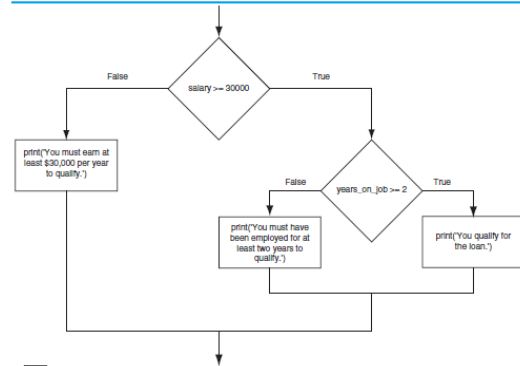
Truth table for the not operator

Expression	Value of the Expression
true	false
false	true

Review Questions

1. Does an `if` statement **always** need to be followed by an `else` statement?
2. If you write an `if-else` statement, under what circumstances do the statements that appear after the `else` clause execute?

3. Assume the variables a = 2, b = 4, c = 6. What do the following statements evaluate to (true or false)?
   a) a == 4 or b > 2
   b) 6 <= c and a > 3
   c) 1 != b and c != 3
   d) a >= -1 or a <= b
   e) not (a > 2)

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In-Class Lab

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