Programming Examples for IF Statements

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Objectives

- To generate random numbers using the **Math.random()** method (§3.7).

- To program using selection statements for a variety of examples (**SubtractionQuiz**, **BMI**, **ComputeTax**) (§3.7–3.9).

Outline

- Discussed
  - Boolean data type and Boolean expressions
  - If-statements (one-way, two-way, multi-way, and nested if-statements) and their flow charts
  - Common errors and pitfalls

- Work on several programming problems
  - Create Subtraction Quiz
  - Compute BMI
  - Compute Taxes
  - Submit the solutions as part of your journal

Problem 1. Subtraction Quiz

- Create a program to teach a first grade child how to learn subtractions.

- The program randomly generates two single-digit integers number1 and number2 with number1 >= number2 and displays a question such as "What is 9 – 2?" to the student. After the student types the answer, the program displays whether the answer is correct.

- Hint: how to generate random numbers?

Generating (Pseudo) Random Numbers

- Math.random()

- The Random class (to be discussed in the future)

Compute BMI

- Body Mass Index (BMI) is a measure of health on weight.

- It can be calculated by taking your weight in kilograms and dividing by the square of your height in meters.

$$BMI = W / H^2$$

where W is the weight in kilograms and H is the height in meters

Examples of BMI

- The interpretation of BMI for people 16 years or older is as follows:

BMI	Interpretation
BMI < 18.5	Underweight
18.5 <= BMI < 25.0	Normal
25.0 <= BMI < 30.0	Overweight
30.0 <= BMI	Obese

Problem 2a. BMI Calculator

- Prompt the user to enter her/his weight in kilograms and height in meters, compute and display the user's BMI

Problem 2b. BMI Calculator (Optional)

- Prompt the user to enter her/his weight in pounds and height in feet and inches, compute and display the user's BMI

Income Taxes

"Our new Constitution is now established, and has an appearance that promises permanency; but in this world nothing can be said to be certain, except death and taxes."

— Benjamin Franklin, in a letter to Jean-Baptiste Le Roy, 1789

- The US federal personal income tax is calculated based on the filing status and taxable income. There are four filing statuses: single filers, married filing jointly, married filing separately, and head of household.

Examples of Taxes

- The tax rates for 2009 are shown below.

Marginal Tax Rate	Single	Married Filing Jointly or Qualifying Widow(er)	Married Filing Separately	Head of Household
10%	$0 – $8,350	$0 – $16,700	$0 – $8,350	$0 – $11,950
15%	$8,351 – $33,950	$16,701 – $67,900	$8,351 – $33,950	$11,951 – $45,500
25%	$33,951 – $82,250	$67,901 – $137,050	$33,951 – $68,525	$45,501 – $117,450
28%	$82,251 – $171,550	$137,051 – $208,850	$68,526 – $104,425	$117,451 – $190,200
33%	$171,551 – $372,950	$208,851 – $372,950	$104,426 – $186,475	$190,201 – $372,950
35%	$372,951+	$372,951+	$186,476+	$372,951+

- How much does an individual pay if her/his (adjusted net) income is $35,000 under the single filing status?
  - 8350 * 10% + (33950 – 8350)*15% + (35000 – 33950)*20%

Problem 3. Federal Income Tax Calculator (using 2009 Tax table)

- Write a program that prompts the user to enter her/his filing status and income, and compute and display the federal income tax

  - All 4 filing status

  - All income brackets

Questions?

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