Programming Examples of 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?