Homework Assignment 2 (100 Points)
CSE 464, Fall 2025
SCAI, Arizona State University
Due: By Saturday Sep 27th 11:59 pm

Please see the submission instructions given on the last page
Note: This is individual homework, DO NOT collaborate, NO AI related tools are allowed

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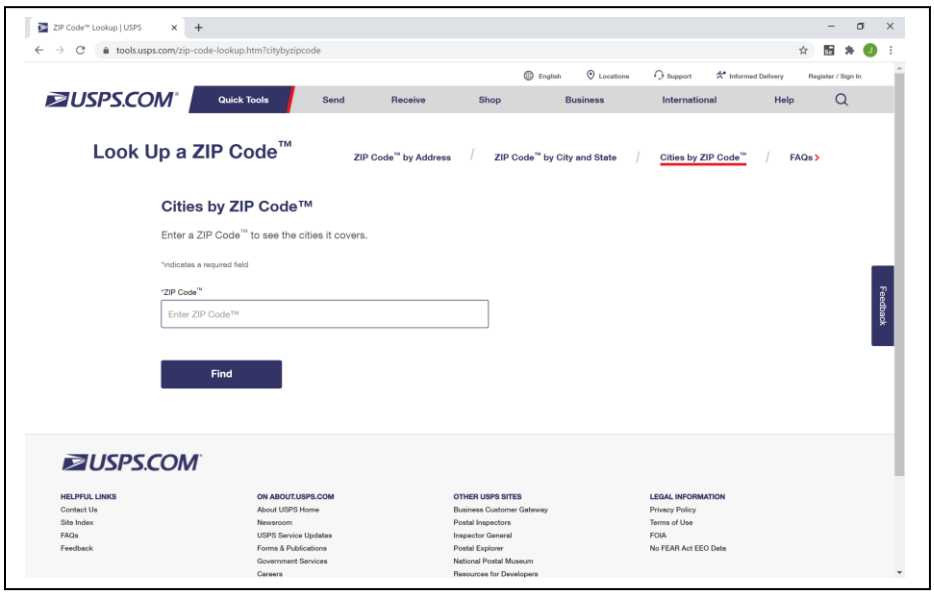
Introduction: This assignment helps you to reinforce the topics discussed in the class including

a) Basic terminology of Testing and Quality Assurance, Software Quality, Software Quality Assurance, and Intro to Testing.
b) Categories of testing and equivalent class testing.
c) Writing Junit test cases for test automation

1. **[25 Points]** Following is the web interface of the zip code lookup functionality of USPS (https://tools.usps.com/zip-code-lookup.htm?citybyzipcode)

   Input: ZIP code
   Output: List of cities



   a) Use the techniques and approaches discussed in the class to determine equivalent classes to test this functionality. Clearly state your approach and equivalent classes(partitions). Points will be given based on the effectiveness and quality of your test cases (part b) and equivalent partitions

b) Develop test cases (a table with test case #, test value, and expected output as columns) based on your equivalent classes and test the system for correctness. The number of test cases should be between 10 and 15. If you have large number of test cases based on your approach, list max 15 test cases and briefly explain how you would obtain other test cases.

c) Do you think USPS has a good implementation of this functionality?

2.[75 Points] BMR Calculation Program Description

Consider an application that accepts three inputs: **age (years), weight (pounds), and height (inches)** to calculate the Basal Metabolic Rate (BMR) of a person.

The program calculates the BMR value using the **Mifflin-St Jeor Equation**:

Men:

BMR = 66 + (6.23 x weight in pounds) + (12.7 x height in inches) - (6.8 x age in years)

Women:

BMR = 655 + (4.35 x weight in pounds) + (4.7 x height in inches) - (4.7 x age in years)

Program Behavior

Based on the values of the input variables or the calculated BMR, the application should provide relevant output:

1. **Invalid Inputs**:
    - Age, height, or weight cannot be negative: age < 0 or height < 0 or weight < 0
    - Age, height, or weight cannot be zero: age = 0 or height = 0 or weight = 0
2. **BMR Categories**:
    - **Low Metabolism**: BMR < 1200 kcal/day
    - **Moderate Metabolism**: 1200 ≤ BMR < 1800 kcal/day
    - **High Metabolism**: 1800 ≤ BMR < 2500 kcal/day
    - **Very High Metabolism**: BMR ≥ 2500 kcal/day

Valid Input Ranges

- **Age**: 0 < age < 120 years
- **Height**: 0 < height < 100 inches
- **Weight**: 0 < weight < 1000 pounds

The program should take gender as an input ("male" or "female") to apply the correct BMR formula.

Suppose you are going to test this application using EP and Boundary Value testing approaches

a) Use the techniques and approaches discussed in the class to determine equivalent classes to test this functionality. Clearly state your approach and equivalent classes(partitions).

b) Develop test cases (a table with test case #, test value, and expected output as columns) based on your equivalent classes and test the system for correctness. Use Weak Robust classification in developing test cases.

c) Develop Junit Test Cases and Test the Assignment2.java program using part b above. How much code coverage do you get from your test cases (Give the screenshot of the code coverage)

Note: Points will be given based on the effectiveness and quality of your test cases (part b) and equivalent partitions

d) Identify boundary values for the three inputs age, height, and weight.

e) Develop test cases (a table with test case #, test value, and expected output as columns) for boundary values using Robustness approach.

f) Develop Junit Test Cases and Test the Assignment2.java program using test cases in part e above. How much code coverage do you get from your test cases (Give the screenshot of the code coverage)

Submission Instructions

Use the Homework #2 Template to submit your solutions to HW2

NO LATE SUBMISSIONS WILL BE ACCEPTED