CSC110 Fall 2024 Problem Set 1

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Part 1: Interpreting Test Results

1. test_class_average_single_student_equal Passed.

   test_section_average_many_students_equal and
   test_class_average_many_students_different Failed.

2. test_section_average_many_students_equal failed because the elements in *sorted_grades* are lists with strings. Therefore, when performing $weights[0] * sorted\_grades[0]$, the interpreter will be multiplying floats to strings, causing the Type error.

   test_class_average_many_students_different failed because the weightings order is incorrect. Instead of using sort(grades), which sorts the grades in ascending order, using sort(grades, inverse = False) will allow the *sorted_grades* and weights list to match correctly.

3. The reason why Test 1 passed, even though we didn't implement float() and used the wrong weightings order, is because Test 1's testing data already consists of floats, the correct datatype for the function, and the marks within the lists are the same so that the order of the weighting doesn't matter.

Part 2: Predicate Logic

1. $S = \{1, 2, 3, 4\}$, $P(x) = x > 3$, and $Q(x, y) = x + 3 \geq y$.

   The definition of $S, P(x), Q(x, y)$ satisfies that Statement 1 is True, and Statement 2 is False.

   Statement 1 is true because, assuming x is greater than 3, x could only be 4. Then, 4 plus 3 is greater than or equal to, for example, y=4 in S.

   Statement 2 is False because the negation looks like: $\exists x \in S, \forall y \in S, x + 3 \geq y\ AND\ x \leq 3$. This negation is True, because there exists $x \in S, x = 3 \leq 3$, and $x + 3 \geq y \Rightarrow 3 + 3 \geq y$ for all $y \in S$, since $y \leq 4$, bounded by S. Therefore, since the negation is True, Statement 2 is False.

   Hence, our $P(x)\ AND\ Q(x, y)$ satisfies the requirement.

2. Complete this part in the provided `ps1_part2.py` starter file. Do **not** include your solution in this file.

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