CS202 Assignment 2 – Shin Minchul

**Q1.       Study of A2Q1\_coin\_change\_limited.py**

1.1 Provide an example input that causes the code to fail

Change Line 12 of *A2Q1\_coin\_change\_limited.py*

From:

|  |
| --- |
| denom.append((curr, random.randint(10, 20))) |

To:

|  |
| --- |
| denom.append((curr, random.randint(1, 2))) |

1.2 Generalize the issue by identifying the common characteristic(s) of input examples that lead to failure.

The failure occurs when the coin supplies are extremely limited, especially when the quantity of each denomination is small (such as input: only 1 or 2).

1.3 Debug this code and justify the changes you made

**Q3.       Asymptotic Analysis**

**3.1      Part 1**

Using the Master Theorem, we now calculate Asymptotic bound for the recurrence:

|  |  |  |
| --- | --- | --- |
|  |  |  |

First, we should get a, b and f(n) to apply for the Master Theorem which are the following:

|  |  |  |
| --- | --- | --- |
|  |  |  |

From here, calculate and compare with .

As , f(n) grows faster. Thus, Case 3 may be applied. Let’s verify the Regularity Condition, it must hold:

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  | |  |  |
|  | |  |  |

The equation satisfied for some c < 1 such as 0.5 hence, case 3 applied to conclude:

**3.2      Part 2**

**- END OF THE ANSWER -**