CSC373 - Problem Set 3

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Question 1

a. Let A(i, h) = maximum grade one can receive on i projects if they spend h number of hours on it. The Bellman equation is as follows. TODO:correctness

$$A(i,h) = \begin{cases} 0, & \text{if } j = 0. \\ max_{0 \le k \le H}(A[i-1, H-k] + f_i(k)), & \text{otherwise.} \end{cases} \quad (1)$$

To maximize the average grade over n courses we will do max $\frac{(f_1(h1)+f_2(h2)...+f_n(hn))}{n}$ which is equivalent to maximizing $\sum_{i=1}^{n} f_i(hi)$

```
BottomUp(n, H):
    for h = 0 to H:
        A(0, h) = 0

    for i = 1 to n:
        max = 0
        for j = 0 to H:
            for k = 0 to j
                g = A(i-1, H-k) + f_i(k)
                if (g > max):
                    max = g
            A(i, j) = max
    return A(n, H) /n
```

b.

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Augmented(n, H):
    for h = 0 to H:
        A(0, h) = 0

    for i = 1 to n:
        max = 0
        for j = 0 to H:
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            for k = 0 to j
                g = A(i-1, H-k) + f_i(k)
                if (g > max):
                    max = g
                    hours(i) = k
            A(i, j) = max
    return hours
```

Question 2

Question 3

a. Let y = Green
Let x = El
Let z = Greelen

The greedy algorithmn would take the 'Gree' portion of z and remove that from y such that y = en. What remains is x = el, y = en, z = len, and from there, the greedy algorithm cannot continue further and must return false.