1. My Answer:
We could make a simple path to have $|V| - 1$ edges, then the maximum number of edges of longest path will not exceed $|V| - 1$, which means this simple path must involve all the vertices in the graph. Based on the definition, the Hamiltonian Path Problem could reduces to the Longest Path Problem.

2. (a) My Python Code:

```python
# Hsuan-You Lin Module 13 Problem Set Question 2.
def cut_rod(prices, n):
    profit = [-1]*(n + 1)
    len = [-1]*(n + 1)
    profit[0] = 0

    for i in range(1, n + 1):
        q = -1
        for j in range(1, i + 1):
            temp = prices[j] + profit[i - j]
            if q < temp:
                q = temp
                len[i] = j
        profit[i] = q

    return profit, len

if __name__ == "__main__" :
    length = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10];
    prices = [None, 1, 5, 8, 9, 10, 17, 17, 20, 24, 30];
    n = 4
    profit, len = cut_rod(prices, n)
    print('The maximum profit that can be obtained is $', profit[n])
    print('The rod needs to be cut into length(s) of ', end='')
    while n > 0:
        print(len[n], end=' ')
        n -= len[n]
        if n == 0: print("\n")
```

```
Module13 — -bash —
(base) pisces:Module13 pisces$ python Q2.py
The maximum profit that can be obtained is $ 10
The rod needs to be cut into length(s) of 2 2

(base) pisces:Module13 pisces$
```

(b) The time complexity of my algorithm is O(N^2), where N is the rod length, and usually price's length is same as the rod length.

(c) The trace of my algorithm running as shown in below:
->The maximum profit that can be obtained is $ 1
The rod needs to be cut into length(s) of 1
-> The maximum profit that can be obtained is $ 5
The rod needs to be cut into length(s) of 2
-> The maximum profit that can be obtained is $ 8
The rod needs to be cut into length(s) of 3
-> The maximum profit that can be obtained is $ 10
The rod needs to be cut into length(s) of 2 2
-> The maximum profit that can be obtained is $ 13
The rod needs to be cut into length(s) of 2 3
-> The maximum profit that can be obtained is $ 17
The rod needs to be cut into length(s) of 6
-> The maximum profit that can be obtained is $ 18
The rod needs to be cut into length(s) of 1 6
-> The maximum profit that can be obtained is $ 22
The rod needs to be cut into length(s) of 2 6
-> The maximum profit that can be obtained is $ 25
The rod needs to be cut into length(s) of 3 6
-> The maximum profit that can be obtained is $ 30
The rod needs to be cut into length(s) of 10