FE-520 Assignment 2

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Submission Requirement:

For all the problems in this assignment you need to design and use Python 3, output and present the results in nicely format.

In your python file, you need contain both function and test part of function. You need to write your code into function with name provided (**wrong name will get 0 points**), and test your function in test block (**if __name__ == "__main__":** . You are strongly encouraged to write comment for your code, because it is a convention to have your code documented all the time.

Python script must be a '.py' script, Jupyter notebook '.ipynb is not allowed. You don't need to submit pdf report this time. Do NOT copy and paste from others, all homework will be firstly checked by plagiarism detection tool.

1 Is Palindrome Number(30 pts)

Please write a function named "is_palindrome" which take an integer as input. The function should return true if input x is palindrome integer.

An integer is a palindrome when it reads the same backward as forward. For example, 121 is palindrome while 123 is not.

1.1 Examples

```
Input: x = 121
Output: true

Input: x = -121
Output: false
Explanation: From left to right, it reads -121.
From right to left, it becomes 121-.
Therefore it is not a palindrome.
```

1.2 Function requirement

```
Name: is_palindrome
```

```
input: Integer
output: boolean
```

2 Dict Practice (30pt)

Write a function named "is_anagrams" which take two strings s and t as inputs. In the function you need to write some logic to determine if t is an anagram of s.

2.1 Assumptions

You may assume input string only contains lowercase alphabets.

2.2 Examples

```
Input: s = "anagram", t = "nagaram"
Output: true
```

2.3 Function requirement

```
function name: is_anagrams
input :String s, String t
output: boolean
```

2.4 Hints

What is Anagram? Please check this: Anagram.
One way to do this is to use Dict.

3 String Practice (30pt)

Write a function named top_k_words which take one string and one integer as input. This function should return the k most frequent words.

Your answer should be sorted by frequency from highest to lowest.

3.1 Assumptions

You may assume input string only contains lowercase alphabets, punctuation, spaces. You may assume k is always valid You may assume no two words have same frequency

3.2 Examples

```
Input: "i love python, he  love coding python; the course is about python.. "
k = 2
Output: ['python', 'love']
Explanation: "python" and "love" are the two most frequent words.
```

3.3 Function requirement

```
function name: top_k_words
input :String s, Integer k
output: List of String
```

3.4 Hint

1. Try to get a clean string (with only space separated). One way to do this is to copy only characters and valid spaces to a new place
2. Then try to split string into one list
3. Get top k words

4 Gradient descent(30pt)

Continue with the last problem in assignment 1, in this problem you should do the same thing within a function. The data could from last problem in assignment
1.Define a function gradient_descent()
1. with 6 arguments, x, y, m, c, epochs(number of iterations), and L(learning rate, set this a default value with 0.001).
2. Return m and c as a result
3. Try to input different number of iterations, 200, 500, 1000, 2000,3000, see the difference among results. (this step doesn't need code)

4.1 Function requirement

```
function name: gradient_descent
input :String s, Integer k
output: Tuple of floats, for example: (m, c)
```