# IS 640 Final Exam

There are two questions in this exam. Please use q1.py and q2.py as your file names for the three questions. Tips and rules for taking the exam:

* Design first, you should know how to do it in English and break the tasks into small steps.
* Work incrementally, code one step at a time, and test the step.
* Use VS Code as your editor. It helps you fix syntax errors.
* Run the code before submission. If the code doesn’t run, i.e., has syntax error, the highest credit is 10 points.
* You can use your book and Internet to search help and check syntax. Don’t ask any person.
* When you complete one question, please submit the file to beachboard dropbox. You can submit a file multiple times and I will grade the last version of q1.py and q2.py.
* *Any cheat such as copying code/design from another person, will fail this course.*

**Question 1** (150 points for q1.py)

Write a program that performs the following tasks:

* (10 points) Set the random seed to 2020
* (20 points) Randomly generate 10,000 numbers between 1000 and 2000 (inclusive)
* (50 points) Find all numbers that are
  + even numbers and
  + can be divided by 7
* (50 points) Count the frequency of the above numbers. Tips: you may want to use a dictionary.
* (20 points) Display the numbers in ascending order and their frequencies as the following (sample output showing the format, not the real result):

1008 17

1022 19

1036 15

…

**Question 2** (150 points for q2.py)

The “alice.txt” is a text file that has multiple lines. It has the following content:

Alice was beginning to get very tired of sitting by her sister on the bank

and of having nothing to do

once or twice she had peeped into the book her sister was reading

but it had no pictures or conversations in it

and what is the use of a book

thought Alice

without pictures or conversations…

Write a program q2.py that performs the following tasks:

1. (50 points) Read the file and create a dictionary that each word in the text file is a key, the value is the line numbers that the word appears in the file. The first line number is 1. If a word appears in a line multiple times, only put the line number once. For example, “it” appears in line 4 two times, only put one “4” as its value.
2. (50 points) Calculate the frequency of each word appears in the file. For example, “Alice” has a frequency of 2, in line 1 and line6. “it” has a frequency of 2, both in line 4.
3. (50 points) Write an output file named “index.txt”. The output is sorted by the key in ascending order: key, frequency and list of line numbers separated by a space. The format is “Key (frequency): line1 line2 line3”. The following is a partial content of the generated “index.txt”:

*Alice (2): 1 6*

*beginning (1): 1*

*book (2): 3 5*

*…*

*it (2): 4*

*…*

*without (1): 7*