Section 1 Problem

In this problem, you will use either a cell or structure array to store a database of classes taken by student X while at Stanford University. Subsequently, the data structure will be used to compute the Grade Point Average (GPA) and other measures of academic performance for student X.

Task 1

Download a text file `courses.txt` containing a list of courses/grades and a function `read_courses.m` that loads the contents of `courses.txt` into a cell array. Feel free to use/modify the code below.

```
g = read_courses('courses.txt');
```

Here is the content of g:

- `g{i,1}` - cell array for course number (cross-listings not included)
- `g{i,2}` - string containing course title
- `g{i,3}` - string containing term course was taken
- `g{i,4}` - double containing number of units
- `g{i,5}` - string specifying whether pass/not pass or letter grade
- `g{i,6}` - string containing grade

Note for Stanford students: The format used in `courses.txt` is exactly the format obtained by copy/pasting one's courses from Axess (under "Course History") into a text file. Therefore, you can use the code from this problem to compute your own GPA and related statistics without having to go through course-by-course and enter the data manually. For this assignment, submit only the output corresponding to `courses.txt`, not your own grades.

Task 2

Load output of `read_courses` into a convenient structure array with fields of your choosing. *Warning* - This will involve parsing strings such as '`AA210A`' to obtain the department `'AA'` and the course number `'210A'` and '`2012-2013 Winter`' to obtain the quarter ('`Winter`') and year (`2013`) the course was taken.

As I have not discussed string parsing, I have provided you with a function `make_course_struct.m` that takes the output of `read_courses` and parses the text in the cell array to a more useful form in a structure array.

Feel free to use/modify the code below or make your own structure.

```
courses = make_course_struct(g);
```

Now, let's talk about Grade Point Average. Grade point average of class set S is defined as

$$\text{GPA} = \frac{1}{\sum_{c \in S_L} u(c)} \sum_{s \in S_L} g(s) * u(s)$$

where $S_L \subseteq S$ is the subset of classes in S taken for a *letter* grade, $g(c)$ and $u(c)$ are the grade letter value and number of units of class $c \in S$, respectively. The letter grade mapping from letter grade to letter grade value can be found here. The letter grade mapping is also taken care of in `make_course_struct.m` if you choose to use it.

Task 3

Use the above data structure to:

- Compute GPA for set of all classes
- Create a bar graph of number of units vs. department
- Create a bar graph of GPA vs. quarter taken (Autumn, Winter, Spring, Summer)
- Create a bar graph of GPA vs. quater *and* year in Stanford career that class was taken (1st, 2nd, ...). Note that we define Year 1 at Stanford as the academic year starting the *Autumn* quarter you arrived at Stanford. Any class taken the summer before your first Autumn quarter would be considered a 0-th year. This was taken care of in `make_course_struct.m` for you.
- Compute total number of classes taken
- Compute total number of graduation units (includes those taken for letter grade and P/NP)

Feel free to use a box below to write a code.

```
%Write your code here%
```

Checkpoint

Please answer the following questions and put the answers in the EdX page:

(A) What is the cumulative GPA? Round it to the nearest hundredth.

(B) Which department is associated with the highest number of units?

(C) Which quarter is associated with the lowest GPA?

(D) What is the difference GPA between the first quarter and the last quarter in the record? Answer as an absolute value rounded to the nearest hundredth.

(E) What is the total number of classese taken?

(F) What is the total number of graduation units (includes those taken for letter grade and P/NP)?