COMP1602: Computer Programming II
Course Work Exam #1
Duration: 1 ½ hours
Answer *all* questions.

1. (a) Write a fragment of code to generate a portion of the ASCII table from 32 to 127, inclusive (96 characters), in two columns, as follows:

```
Decimal     Character       Decimal     Character
32                          80          P
33          !               81          Q
34          "               82          R
...                         ...
...                         ...
79          O               127         ⌂
```

[5]

(b) A C-string is a character array with a null terminating character (`'\0'`). You are *not* allowed to use any of the functions built into the C-string library.

i) Write a function:

```
int length (char s[])
```

which accepts a c-string `s` and returns the number of characters in `s`. [1]

ii) Write a function:

```
void append (char s[], char t[])
```

which accepts two c-strings `s` and `t` and adds the contents of `t` to the *end* of the contents of `s`.
Assume that `s` has enough space to hold the contents of `t`.
The `length` function may be used. [3]

iii) Write a function:

```
bool isDigit (char c)
```

which accepts a character `c` and returns *true* if it is a digit and *false* otherwise. [1]

iv) A C-string `s` contains only one integer value, for example "weight = 567 kg".
Write a function:

```
int getInt (char s[])
```

which accepts a C-string `s` and returns the integer value in `s`. [5]

Total marks: 15

2. The manufacturer of a popular chocolate is running a contest in which you must collect letters inside the wrapper to spell the word L-I-G-H-T-S. It is known that in every 100 wrappers, there are 11 Ls, 15 Is, 16 Gs, 8 Hs, 23Ts and 27 Ss.

(a) Write a function, `collect`, to simulate the collection of the letters inside the wrappers until L-I-G-H-T-S can be spelled. Your function must return the number of wrappers collected. [12]

(b) Using the function `collect` from (a) above, write a segment of code to perform 20 simulations of collecting the letters inside the wrappers until L-I-G-H-T-S can be spelled. Your code must print the average number of wrappers collected in each simulation. [5]

Total marks: 17

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3. The definition for a Date structure to represent a given date is as follows:

```
struct Date{
    char dayName[8];
    int day;
    int month;
    int year;
};
```

(a) A leap year is one that is either divisible by 400 or divisible by 4 but not by 100. For example, 2000, 2004, and 2016 were leap years but 2015, 1900, and 1800 were not. Write a function `isLeapYear` which accepts a year as a parameter (an integer value) and returns *true* if year is a leap year or *false* otherwise. [3]

(b) Write a function, `isValidDate`, which accepts a *Date* structure as a parameter and returns *true* if the date is valid and *false* otherwise. The functions checks the day, month and year values in the *Date* structure. The day name is ignored. [5]

(c) Write a function `readDate` which reads a set of dates from a file, *dates.txt* (format: day name day month year) and stores only the valid dates in an array of *Date* structs passed as a parameter. The function should return the amount of structs stored in the array. Assume that there are at most 1000 dates. The day name `"END"` terminates the data. [5]

```
Tuesday     12    5     2015
Monday      66    3     2012
Monday      12    1     2015
END
```

Total marks: 13

End of Examination