COMP1602: Computer Programming II
Course Work Exam #3
Duration: 1 hour

Answer *all* questions.

1. a. Write a function *isLetter* which given a character, *ch*, as a parameter, returns *true* if *ch* is a letter and *false* otherwise. The function should consider both upper case and lower case letters. [2]

   b. A pangram is a series of words which contains *all* the letters of the alphabet. The letters of the words may be in upper case or lower case. The most famous English pangram is probably:

   The Quick Brown Fox Jumps Over The Lazy Dog

   Write a function, *isPangram*, which accepts a C-string *s* as a parameter and returns *true* if the words in *s* form a pangram and *false* otherwise.
   Your function must make use of the *isLetter* function written in 1. a. above. [8]

Total marks: 10

2. a. The array below is sorted in ascending order:

12	17	35	47	89	99
0	1	2	3	4	5

   Using a *binary search technique*, how many comparisons are needed to find the following keys?

   i. 47
   ii. 55

   Show all working. [6]

   b. A *square* matrix is a matrix where the number of rows is equal to the number of columns. *M* is a square matrix of size *n*. A square matrix is *sparse* if it contains less than 20% of non-zero values. Write a function which returns *true* if M is sparse and *false* otherwise. The prototype for sparse is:

```
bool isSparse(int M[][n], int n);
```

   [4]

Total marks: 10

3. In the game of cricket, based on his past statistics of play, a batsman has the probability of scoring runs when he "faces" a ball as shown in the table.

Runs	Probability
6	5%
5	3%
4	12%
3	5%
2	25%
1	30%
0	13%
out	7%

   a. Write a function to simulate how many balls the batsman must face to score five (5) sixes or ten (10) fours or get out. Your function must return the number of balls faced by the batsman. [6]
   b. Using your function in a., write code to perform five (5) simulations and display the average number of balls needed. [3]

Total marks: 9

4. An avid YouTube fan has a file, *uploads.txt,* which contains statistics on the videos viewed on YouTube. For each video the file contains the title, author, number of views and duration. The duration of the upload is stored in minutes and seconds.
Some rows of the file are shown below

```
Thor_Vs_Hulk          Hero_Smashers      441179          4     14
Grimm                 Telestrekoza1      192390          3     40
The_Grinch_Trailer    File_Select        765081          3     05
```

Write a program to:

a. Declare a struct of type *Duration* to store the duration of the video. [1]
b. Declare a struct of type *Video* to store all the video information. [1]
c. Read the entries from the file and store the video's data in an array. The data is stored in ascending order by number of views. Assume that there are at most 1000 videos. [10]

Total marks: 12

End of Examination

Total marks: 40