CS201 (Intro. to Computing) MIDTERM II SAMPLE QUESTIONS – Fall 2015

- Those questions do not imply any favorite subject or question type for the questions in the actual exam
- Please also review recitation questions, samples covered in the class, homeworks and the questions in the book as well
- The amount of questions here is of course much more than the actual exam.

QUESTIONS

1)) Write a program that solves the following problem:

If April 23rd of a year is a Sunday, what would be the day of week for October 29th of the same year?

Use date class!

2)
a) Write a function that takes a date parameter and returns the number of days between that date and the last day of that month.

b) Write a function that takes a string parameter (call it `str`) and returns true if the value of `str` is "Turkey", returns false otherwise. <u>All</u> combinations of upper and lowercase letters in "Turkey" are acceptable. For example "TuRKey" or "TUrkeY" (among may other combinations) should also return true.

c) Consider the following loop

```
int sum = 0;
RandGen r;
for (int a=1; a<=20; a++)
{
     sum+=r.RandInt(1,a);
}
```

What can you say about the value of sum after this loop?

d) What is the output of the following program piece?
(December 10, 2002 was a Tuesday)

```
Date day(12,10,2002);
Date horrorday = day + 3;
string s=horrorday.DayName();
cout << horrorday << " " << s;
```

3)

Write a function that takes a real number as parameter and returns its fractional part. For example, if the parameter is 145.943422, the function should return 0.943422. As another example, if the parameter is -2.4, the function should return 0.4.

Write a program that inputs 10 real numbers from keyboard and finds out the real number with the largest fractional part. Your program should display this number. Program should use the above function.

Moreover your program should check if the input numbers are real number or not. If a particular input is not a real number, it should be re-entered by the user until a real number is entered. 10 is the number of real numbers!

4) Suppose you have the following function defined in a library

```
bool isTurkish (const string & str);
// post: returns true if str is a syntactically correct
// Turkish word
```

Write a program that reads a file and displays non-Turkish words of that file on screen. The program should also display the total number of such words. Do not write the `isTurkish` function body, just use it.

In the program, input the file name, open it and check if it is opened successfully or not.

5) In a hypothetical country, May 23 and August 28 are holidays. Moreover, all Saturdays and Sundays are holidays as well. Write a function that takes an integer parameter to represent a year value. This function must return the total number of holiday days in this parameter year.

6) Add a member function to the robot class to move the robot object to one of the four diagonal neighbors (southeast, southwest, northeast and northwest). This member function will take two `Direction` type parameters to specify the diagonal cell. If the parameters are `east` and `south` (in any order), then the move the robot to the southeast neighbor; if `west` and `south` (in any order), then move to southwest cell; so on. Of course, the robot will complete this movement in two steps.

Moreover, write a program in which a robot is created at (0,0) location. Then pick a random number, say n, between 1 and 20 and move the robot to (n, n) location in a diagonal manner using the above-defined diagonal move member function.

7) This question is taken from TZV's (Turkiye Zeka Vakfı) OYUN'2002 first elimination step questions.

"*Çok ilginç. Bu ay Pazartesi günüyle başlıyor, Pazartesi günüyle bitiyor.*" Doğru olan bu önerme en son hangi yılın hangi ayında yapılmış olabilir?

"Very interesting. This month starts with a Monday and ends with a Monday." In which month of which year this correct proposition has been done last?

Write a program to solve this question. Write the program such that it takes the day of the week (Monday in the question) as input so that you can use the program to solve the same problem for different days.

8) Add another member function to dice class called

biased_roll(int n, double prob)

This function should return a random number between 1 and the number of sides, but the probability of returning *n* must be *prob*. Other options are equally likely.

In the program create a 6-sided die. Roll this die *n* times, where *n* is an input from user, in a biased manner so that the probability of ending up with 1 is 50% at each roll. At the end, display the actual percentages of the total numbers of 1's, 2's, 3's, 4's, 5's and 6's out of *n* rolls.

9) Write a program that reads a file of integers and check if all integers between 0 and 999 occur at least once in that file.

Assume that the file does not have any non-integer value, but there might be numbers that are not between 0 and 999.

Please be aware that there is only one reasonable way of keeping 1000 different variables for the occurrences of each of the numbers: VECTORS and ARRAYS. Since we have not covered vectors and arrays yet, the only way to solve this problem with your current knowledge is to pass over the same file several times.

10) Write a program that copies one file to another with *last* line removed. You should input names of the files in the program. You do not have to check if the files are opened successfully or not.

11)
a) What is the result of the following expression?

```
char('a' - 'A' + 'G')
```

b) What is a possible use of `cin.clear()`?

c) Which prototype is more efficient and why?

```
void stringprocess (const string & str);

void stringprocess (string str);
```

d) Write a function prototype that removes the vowels of its string parameter. The resulting string will not be displayed, but will be returned parametrically (not using `return` statement). Do not write the function body, write only the prototype.

e) (Courtesy of Berrin Yanıkoğlu) What does this function do? **Be clear** and **give it a name**.

```
int Mystery(int number)
{
    int count = 0;
    while (number > 0)
    {
        number /= 10;
        count++;
    }
    return(count);
}
```

12) What is the output of the following program?

```cpp
#include <iostream>
using namespace std;

int doit (int n, int & a)
{
    cout << n << " " << a << endl;
    n++;
    a = a + n;
    cout << n << " " << a << endl;
    return a+n;
}


void dothat (int & a, int & n)
{
    int t = a;
    cout << a << " " << n << " " << t << endl;
    a = 2*n;
    n = a - 10;
    cout << a << " " << n << " " << t << endl;
}


int main()
{
    int a = 8, b = 5, n = 2;
    a = doit(a, b);
    cout << a << " " << b << " " << n << endl;
    dothat(n,a);
    cout << a << " " << b << " " << n << endl;
    return 0;
}
```

13)

Design a class for a *regular polygon*. See
http://www.math.com/tables/geometry/polygons.htm for definitions and formulas needed in
this question. Use your judgment for the private data. As the member functions, you have to
have the followings:

- A constructor that creates a regular polygon given the number of sides and the length of
  one side as parameters.

- A member function to calculate and return the area of the regular polygon object.

- A member function that returns one of the interior angles in degrees.

- A member function that increments the number of sides of the polygon by one. For
  example, if the polygon was a hexagon before this member function call, it becomes
  heptagon after the function call.

You are expected to give both class definitions (private/public parts) and member function
implementations.

14) Write a function that takes an input file and an output file as parameters. You may assume
that both files are opened successfully and the file position pointer is at the beginning of the
file before the function call. The function will read the input file and creates a copy of it in the
output file by capitalizing the first non-blank characters after all full-stop (dot) characters, if
that non-blank character is a lowercase letter.

There might be several blanks after the full-stop characters. You have to handle such cases
and find out the first non-blank one.

Your function should keep the number of blanks between words and the line structures the
same in both input and output files.

15) Write a function that takes two strings as parameters are scans those strings backwards.
The function should count and return the total number of characters that are the same from
backwards at corresponding locations. The search for the same character should stop when a
different character is found.

For example if the strings are "koysalar onume bariyer de" and
"cocuk da yaparim kariyer de", then the function should return 9 due to
"ariyer de" part of both strings.

16) Recall the 5th homework. How would you change the random turn member function to
add more intelligence (for the monsters) such that the robot object first searches for a
neighboring robot at all of the four directions. If found, then turns towards it. Otherwise picks
a non-walled random direction.

17) Suppose you have the following prototypes in your program.

```
void XYZ (int a);
void XYZ (double d);
```

We used the same name for both of the functions. Does it cause a problem? Explain your answer.

18) Dice class definition is given below.

```
class Dice
{
public:
    Dice(int sides); // constructor
    int Roll(); // return the random roll
    int NumSides() const; //return number of sides this die has
    int NumRolls() const; //return number of times this die rolled

private:
    int myRollCount; // number of times die rolled
    int mySides; // number of sides on die
};
```

In this question your task is to add a new member function to Dice class. This member function is called ResetRollCount and should reset the roll count of the dice object to zero without recreating it.

a) Show the necessary changes in the class definition in order to add ResetRollCount member function. Give your answer on the class definition above.

b) Is ResetRollCount member function an accessor or mutator? Justify your answer.

c) Write the implementation of ResetRollCount member function.

19) What is the output of the following program piece?

```
cout << "\\\\\n\"\nlet\'s support SU sport teams\n\"";
```