CS19003 Programming and Data Structures Lab

Assignment Set 1 **March 14, 2023**

INSTRUCTIONS

1. There are four assignments in this Lab. You need to submit each of these separately. It is advisable to submit each assignment as you complete it, rather than wait for the end to submit everything.
2. Your source program files must be named exactly as indicated (note that names are case sensitive)
3. Please write a header as indicated below in each of your submissions

```
/*********************************
* Section : 8
* Machine No : Write your machine number
* Roll No. : Write your roll number
* Name : Write your full name
* Assignment Filename : Write your assignment filename
* Remarks : You may need to write remarks in later assignments
 *********************************/
```

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1. **[Filename: set1asg1.c]**

   Day of the week. Write a C program, which takes a date as input and prints the day of the week that date falls on. Your program should take three integer inputs: m (month), d (day), and y (year). For m use 1 for January, 2 for February, and so forth. Use the following formulas, for the Gregorian calendar:

```
y0 = y - (14 - m) / 12
x = y0 + y0/4 - y0/100 + y0/400
m0 = m + 12 * ((14 - m) / 12) - 2
d0 = (d + x + (31*m0)/ 12) mod 7
```

   For example, on what day of the week was August 2, 1953?

```
y = 1953 - 0 = 1953
x = 1953 + 1953/4 - 1953/100 + 1953/400 = 2426
m = 8 + 12*0 - 2 = 6
d = (2 + 2426 + (31*6) / 12) mod 7 = 2443 mod 7 = 0  (Sunday)
```

   Your program must print “Sunday” when the above formula computes 0, “Monday” when it computes 1, “Tuesday” when it computes 2, and so forth.

2. **[Filename: set1asg2.c]**

   Logic Problems. A certain country is inhabited only by knights and knaves. Knights always tell the truth and Knaves always tell lies. Both Knights and Knaves respond to questions only with a "yes" or "no". A tourist encounters two people from this country, say person A and person B. The tourist asks Person A: *"Are both of you knights?"*, and then asks Person B: *"Is Person A a knave?*". Based on the answers from Person A and Person B, the tourist has to decide whether Person A is a knight or a knave, and whether Person B is a knight or a knave.

   Write a C program, which will ask the above questions to the user and then print the decision of the tourist about each person. The decision can be Knight, Knave or Unknown.

3. **[Filename: set1asg3.c]**

   Bounding Circle. Write a C program, which reads the radius and coordinates of the center for two circles. The program prints the radius and coordinates of the center for the smallest circle that encloses the two circles.

4. **[Filename: set1asg4.c]**

   Checksums. The International Standard Book Number (ISBN) is a 10-digit code that uniquely specifies a book. The rightmost digit is a *checksum* digit which can be uniquely determined from the other 9 digits from the condition that $d_1 + 2d_2 + 3d_3 + ... + 10d_{10}$ must be a multiple of 11 (here d_i denotes the ith digit from the right). The checksum digit d_1 can be any value from 0 to 10: the ISBN convention is to use the value X to denote 10. *Example*: the checksum digit corresponding to 020131452 is 5 since it is the only value of d_1 between 0 and 10 for which $d_1 + 2*2 + 3*5 + 4*4 + 5*1 + 6*3 + 7*1 + 8*0 + 9*2 + 10*0$ is a multiple of 11. Write a program, that reads a 9-digit integer, computes the checksum, and prints out the fully formatted 10-digit ISBN number, for example in the format: 0-201-31452-5.