**Name: Session:**

**Programming II**

**Lab Exercise 5/10/2021**

**More Console Applications**

In this lab you will create several more console applications using a variety of techniques that you have used in the past 3 days.

1. Write a Console Application that will input a single letter and convert it to a telephone digit. Use the following conversion:

2 – ABC 3 – DEF 4 – GHI 5 – JKL 6 – MNO 7 – PRS

8 – TUV 9 - WXY

Note that Q and Z do not correspond to a value.

1. Zeller's congruence is an algorithm devised by Christian Zeller to calculate the day of the week for any Julian or Gregorian calendar date. It can be considered to be based on the conversion between Julian day and the calendar date.

For the Gregorian calendar, Zeller's congruence is

h = \left(q + \left\lfloor\frac{13(m+1)}{5}\right\rfloor + K + \left\lfloor\frac{K}{4}\right\rfloor + \left\lfloor\frac{J}{4}\right\rfloor - 2J\right) \mod 7,

where

* *h* is the day of the week (0 = Saturday, 1 = Sunday, 2 = Monday, ..., 6 = Friday)
* *q* is the day of the month
* *m* is the month (3 = March, 4 = April, 5 = May, ..., 14 = February)
* *K* the year of the century (year mod 100).
* *J* is the [zero-based](https://en.wikipedia.org/wiki/Zero-based) century (actually year \ 100) For example, the zero-based centuries for 1995 and 2000 are 19 and 20 respectively (to not be confused with the common ordinal century enumeration which indicates 20th for both cases).

**NOTE**: In this algorithm January and February are counted as months 13 and 14 of the previous year. E.g. if it is 2 February 2010, the algorithm counts the date as the second day of the fourteenth month of 2009 (02/14/2009 in DD/MM/YYYY format)

Implementation in software can become a problem as the formula relies on the mathematician's definition of [modulo](https://en.wikipedia.org/wiki/Modulo_operation) division, which means that −2 mod 7 is equal to positive 5. Unfortunately, the way most computer languages implement the remainder function, −2 mod 7 returns a result of −2. So, to implement Zeller's congruence on a computer, the formulas should be altered slightly to ensure a positive numerator. The simplest way to do this is to replace − 2*J* by + 5*J* and − *J* by + 6*J*. So the formulas become:

h = \left(q + \left\lfloor\frac{13(m+1)}{5}\right\rfloor + K + \left\lfloor\frac{K}{4}\right\rfloor + \left\lfloor\frac{J}{4}\right\rfloor + 5J\right) \mod 7,

In Python, -2 % 7 is 5 so you can use the first formula. Your task is to find out how Visual C# implement modulo division and use the appropriate formula.

1. Modify problem 1 so you can enter a phone number of the form XXX-XXXX and it will find a word to from a word list. If you would like to solve this problem in Python, you are more than welcome to.

When you have completed these applications, submit your source code and a sample output.