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Senior Project 2

Modular Programming

Real life applications: After some research I have found that modular arithmetic can be used for many things that we may not know about in real life. Such as calculating checksums for ISBNs and bank identifiers (Iban numbers) to identify errors. It also used a lot in cryptography, finding day of a given date, validation of a credit card number, etc.

Many compare modular arithmetic to that of a clock. Which is why it’s deemed the “clock-arithmetic.” Because the hour value of the clock resets when it passes midnight each time. It resets back to 0. If it’s 3 o’clock, in 10 hours it will not be 13 o’clock. It resets back to 0, so the time is 1 o’clock. This is a simple example of modular arithmetic. Famous algorithm’s for modular arithmetic includes ones such as, luhn’s algorithm (for credit card validation, and zeller’s congruence (used for finding the day of a given date).

There are countless numbers of ways modular arithmetic can help you in real life. A few things that fascinated me are the credit card validations using mod 10 based on the Luhn algorithm. The second one has to do with the Zeller algorithm to determine the day of a given date. This is the one I am most interested in because I believe I can try and create a program/algorithm similar to this. Zeller algorithm uses modular arithmetic to determine the day of the year. This is more complicated than it seems because of how the days are structured.

The Zeller Congruence algorithm is used to determine the day of the month. For example, you would plug say, February 1st 2021 into the formula, and it would say it was a Monday. This should work for past and future dates as well.

What I want to do:

I want to base my SP2 off of this Zeller Congruence. I want to construct an algorithm or a program that can work for something related to dates with modular arithmetic. I would like to divide my project into 2 labs that I submit. Some things I would like to work on is a modular program that can help people in real life when finding days of the year. For example, it would be an application that would ask the user how many days away is it for their specified date. IE: It is Feb 5th, and you need to know the date it will be in 37 days. This could be useful because you could have certain deadlines to meet in the workplace, etc. There could be plenty of applications for this.

The reason this can be complicated is how the calendar days work. It’s simply not adding 37 onto 5. Some months are different than others as well. This is something I would like to do for lab 1.

Lab 2 would be something related to it as well. Each subsequent lab I want to be an ADDITION to the previous lab. This Senior project isn’t composed of multiple labs with different topics on each. They are all related. The next lab I would like to work on is an algorithm/program using modular arithmetic for determining the time of day. Since as I stated earlier, if it is 3 o’clock, you add 10 to it, it is not 13 o’clock. It would be an application to find the specific time of day for someone if they have said, “15 hours to complete this deadline, etc.”

The program would just be displayed onto the command line. It doesn’t need to be fancy at all because the main difficulty would be coming up with algorithm and or programs that solve the issue with modular programming. This project is mainly about using modular arithmetic’s strengths to develop applications that can be easily used by people that require dates. It is a project that takes inspiration from one of the most famous date algorithm’s using modular programming, and expands that idea to develop other applications.