**PROJECT REPORT**

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# 1 Introduction

Project Math is the name of our project work, which is part of Developer Basic Skills course in Oulu University of Applied Sciences. In the beginning of the course we studied programming and maths (among other things) for five weeks and then the last three weeks of the course were assigned to project work. In this project we were assigned to implement the skills learned during the preceding five-week period.

The task of this project work was to design and implement a web based mathematical tool. This tool included math functions on a web site by using HTML, CSS and Javascript. The additional feature was to create the site so that it would also be educational.

# 2 THE WORK ENVIRONMENT

We used Visual Studio Code when programming with HTML, CSS and Javascript. We had two folders where we did changes: the official one and one for testing our changes. When we got our codes working in testing file, each team member committed and pushed the changes to git and then others pulled the changes and pushed their own changes to git. We could have used branching too, but we found this solution easier in keeping track of the working tree.

# 3 Definition

The project itself had the requirement of having to implement six different mathematical functionalities to a website where you could show the results of your work in. These consisted of, number system conversions, number system outputs, combinatorics, truth tables and random numbers. The sixth functionality was optional.

**3.1 Number system conversions**

In number system conversions the idea was to create a tool for converting numbering systems. These numbering systems were DEC, BIN, OCT and HEX. Input validation was also required.

**3.2 Number system outputs**

In this task we were assigned to do a conversion table with BIN, OCT and HEX from 0 to 50. The table could have been hard coded or done with javascript, so we did it with javascript. The page needed to have also “clear table” button.

## 3.3 Combinatorics

Combinatorics task was to create a tool which will calculate either combinations or permutations. If permutation was done, then sampling had to be done and if combinations were done, then sampling had to be disabled.

## 3.4 Truth tables

In truth tables the basic idea was to create basic set of truth tables with basic operators. Hard coding was not allowed.

## 3.5 Random numbers

In this task we were assigned to do a random number generator which would also show the distribution.

## 3.6 Optional task

Our optional task was Fibonacci sequence. Fibonacci sequence in maths means that each number is the sum of two previous numbers starting from 0 and 1.

# 4 Implementation

We did extensive research on each task including searching the web, asking teachers and classmates. We needed to do this, because for some of us the issues which we needed to implement in this project, were unknown to us. All in all, this project was challenging for those whose previous programming experience was limited to the studying time in this school.

# 5 Testing

We tested our web application in every development stage. Before we committed our own changes, we tested that our testing version works. Those tasks in which the user inputs values, we did debugging with random values. Fixing some bugs was challenging, but we managed well.

# 6 POSSIBILITIES OF FURTHER DEVELOPMENT

The further development could include adding more educational elements to the web application. This can take some time, because the mathematical operations of this project are not high school level, but more advanced. For that reason, the theory behind these mathematical functionalities is complicated to explain in written.

Another possibility for future development would be adding more mathematical operations.

# 7 user interface design material

A close up of text on a white background

Description automatically generated

*FIGURE 1. The home page of our project as a paper prototype*

*A close up of text on a white background

Description automatically generated*

*FIGURE 2. The idea of side sliding menu and appearing content in the page presented*

We, firstly, designed the web site so that it will have main page with text “Hello” and a side sliding menu which will come visible only when clicking black arrow on the left-hand side of the page. After choosing a link from the side sliding menu, the content of the page should have appeared in the middle of the page replacing the text “Hello”.

We soon realised that this was not a good idea, because we did not want to create separate HTML file for every functionality. Therefore, we came up with an idea to create the whole content with using one HTML file and creating tablinks to it. Tablinks were placed on the “header” of the page (we did not create actual header).  Each tablink opened the corresponding functionality to the middle of the page.

We learned from this that it is easy to adjust the web application at the early development stage.

# 8 conclusion

Our team was very dedicated to this project. We learned how to work in a project and how to endure deadlines and possibly also stress related to it. We experienced frustration and moments of success, like every real programmer does. We also went out of our comfort zone.

It was educative to be lost and then start to find solutions on how to get back on track of your task. These feelings are going to be around after we graduate and go to working life. Finding new solutions and surpassing difficulties are essential skills of an engineer. It is also important to note that this was the first project of the year and all things considered we all managed to pull through despite the difficulties. As with all project environments it was great to both learn new things and implement them to the project while consulting fellow classmates and occasionally requesting assistance from the teachers themselves. Knowing when to ask for help so the progress itself would not be halted for too long will provide helpful in the long run.

Here is a [link](https://oamk-my.sharepoint.com/:x:/r/personal/t7mati01_students_oamk_fi/_layouts/15/Doc.aspx?sourcedoc=%7Bc89123aa-ca33-435c-8d48-b9febf354b50%7D&action=default&uid=%7BC89123AA-CA33-435C-8D48-B9FEBF354B50%7D&ListItemId=15&ListId=%7BD6F6DFEA-E080-406E-819A-FA03596FC9EE%7D&odsp=1&env=prod) to our excel worksheet

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