Computer Science 3B
Practical Assignment 06

Assignment date:	2020-09-10
Deadline	2020-09-10 17h00

Marks: 60

This practical assignment must be uploaded to eve.uj.ac.za **before** 2020-09-10 17h00. Late or incorrect submissions **will not be accepted**, and will therefore not be marked.

You are **not allowed to collaborate** with any other student. Plagiarism is not tolerated. All submissions are tested for plagiarism.

Good coding practices include a proper coding convention and a good use of commenting. Marks will be deducted if these are not present. See the reminder page for more details.

A **prime number** is a natural number that is greater than 1 and divisible only by 1 and itself (e.g. 17 is prime while 16 is not).

A **Mersenne prime** is a prime number that is 1 less than a power of 2 (e.g. 3 is a Mersenne prime since $3 = 2^2 - 1$).

A **Fermat prime** is a prime number that is 1 more than a power of 2 (e.g. 5 is a Fermat prime since $5 = 2^2 + 1$).

Write an 80x86 assembly program to calculate Mersenne primes and Fermat primes. In order to calculate the different primes the following functions will be needed:

- A function to test if a given parameter is prime.
- A function to calculate a power of 2 recursively.
- A function to calculate a power of 2 using bit shifting.

Use the recursive power function to calculate Mersenne primes. Use the bit-shift power function to calculate Fermat primes. Calculate and display the first 5 Mersenne primes and the first 5 Fermat primes.

Mark sheet

1. Design **[10]**

2. Test prime number function **[10]**

3. Recursive power of 2 function **[05]**

4. Bit-shift power of 2 function **[05]**

5. Calculating and displaying the Mersenne primes and Fermat primes **[10]**

6. Structure and layout (no temporary global variables, correct data types) **[05]**

7. Commenting **[05]**

8. Correct execution **[10]**

NB

Submissions which **do not assemble** will be capped at 40%!

Practical marks are awarded subject to the student's ability to explain the concepts and decisions made in preparing the practical assignment solution.

(Inability to explain code = inability to be given marks.)

Execution marks are awarded for a correctly functioning application and not for related code.

Reminder

Your submission must follow the naming convention below.

SURNAME_INITIALS_STUDENTNUMBER_SUBJECTCODE_YEAR_PRACTICALNUMBER

Example

Surname	Berners-Lee	Module Code	CSC3B
Initials	TJ	Current Year	2020
Student number	209912345	Practical number	P06

Berners-Lee_TJ_209912345_ CSC3B_2020_P06

Your submission must be **a single zip (compressed) file**!

Your submission must include the following folders:

File	Naming	Folder	Purpose
Design	STUDENTNUMBER_Design.pdf	docs	Contains your program design. All files must be in **PDF** format. Your details must be included at the top of any **PDF** files submitted.
Source	STUDENTNUMBER_P06.asm	src	Contains all relevant source code. Your details must be included at the top of the source code.

Multiple uploads

Note that only **one** submission is marked. If you already have submitted once and want to upload a newer version then submit a newer file with the same name as the uploaded file in order to overwrite it.