Computer Science 3B

Practical Assignment E3

Assignment date:	2024-10-14
Deadline	2024-10-18 17h05
Marks: 100	

This practical assignment must be uploaded to eve.uj.ac.za **before** 2024-10-18 17h05. Late[1] or in-correct 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.

The reminder page includes details for submission. Please ensure that **ALL** submissions follow the guidelines. The reminder page can be found on the last page of this practical.

A hypotrochoid is a roulette traced by a point attached to a circle of radius **radiusRoll** rolling around the inside of a fixed circle of radius **radiusFixed**, where the point is a distance **dist** from the center of the interior circle.

The parametric form of the equations to draw a hypotrochoid are as follows:

$$\boldsymbol{x}(\theta) = (\mathbf{radiusFixed} - \mathbf{radiusRoll})\cos\theta + \mathbf{d}\cos\left(\frac{\mathbf{radiusFixed} - \mathbf{radiusRoll}}{\mathbf{radiusRoll}}\theta\right)$$

$$\boldsymbol{y}(\theta) = (\mathbf{radiusFixed} - \mathbf{radiusRoll})\sin\theta - \mathbf{d}\sin\left(\frac{\mathbf{radiusFixed} - \mathbf{radiusRoll}}{\mathbf{radiusRoll}}\theta\right)$$

Write an 80x86 assembly DLL. **No design is required!** The DLL will contain the following functions:

```
// The parametric function X(θ).
float hypotrochoidX(float theta, int radiusRoll, int radiusFixed, int dist);

// The parametric function Y(θ).
float hypotrochoidY(float theta, int radiusRoll, int radiusFixed, int dist);
```

Reminder: Leave the final answer on the FPU stack!

Important

The following has been provided under additional files for this practical:

- DLL template code
- Executable that will use your DLL (use this executable to test your program)

[1] Alternate arrangements for exceptional circumstances will been posted on eve.

Mark sheet

Marks are based on how well does each function in your DLL works based solely on output.

1. ***hypotrochoidX*** function **[50]**
2. ***hypotrochoidY*** function **[50]**

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: `Berners-Lee_TJ_209912345_CSC03B3_2024_PE3`

Surname	Berners-Lee	**Module Code**	CSC03B3
Initials	TJ	**Current Year**	2024
Student number	209912345	**Practical number**	PE3

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

Your submission must include the following folders:

File	Naming	Folder	Purpose
Source	PE3.dll	src	Contains your DLL file created for this assignment.
Source	PE3DLL.asm	src	Contains all relevant source code. Your details must be included at the top of the source code[0].

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.

[0] Failure to correctly indicate your details will result in a penalty.