2021 Fall CPSC 240-1

Midterm Concepts Test #1

30 Sept 2021: 2:30pm – 6:29pm

Take Home Test

Explanation: The standard time for this test is 2:30pm to 4:30pm. The extra time is added as a free gift for those few who feel stress programming in a timed environment. It is not mandatory that you continue belong 4:30. It is all voluntary.

Read me

Create a program that meets the specifications on the next page.

Source code requirements

The professional style of organizing source files is not required.

You must place this information in each submitted file. These are the “ID Comments”.

Student name	
CPSC240-xx	where xx is your section number
Your email address	
Program name	You create a name like “Electricity” or something nicer.

Inside the assembly file these are the requirements

Show the block structure with descriptive header for each block
Back up pushes are required
Restore pops are required
Line-by-line comments may be omitted.

Near 6:25pm you need to save your files. Send me three files as attachments: faraday.ccc, ohm.asm, and r.sh Submissions with time stamp after 6:29 will be deleted. Submitted files must be readable using a text file editor. No jpeg, no png, no gif, no wav, no bmp, no flac, no svg.

There is no gdb in this program. Gdb will happen in Midterm#2.

When you are finished send me your source files along with the bash file to the usual address: holliday@fullerton.edu

Description

Imagine you're in a science lab where some other people are running experiments using electricity in different circuit configurations.

You are there because the chief administrator of the lab has asked for software that will compute the electric force between two charged particles

This lab encourages open notes because the chief does not want you to use the wrong formula accidentally. Online you lookup the following equation.

$F = k \times q_1 \times q_2 / r^2$

where the symbols have the following meanings

F is the electromagnetic force acting of one particle on the other particle measured in Neutons

q_1 is the electric charge on particle #1 measured in Coulombs

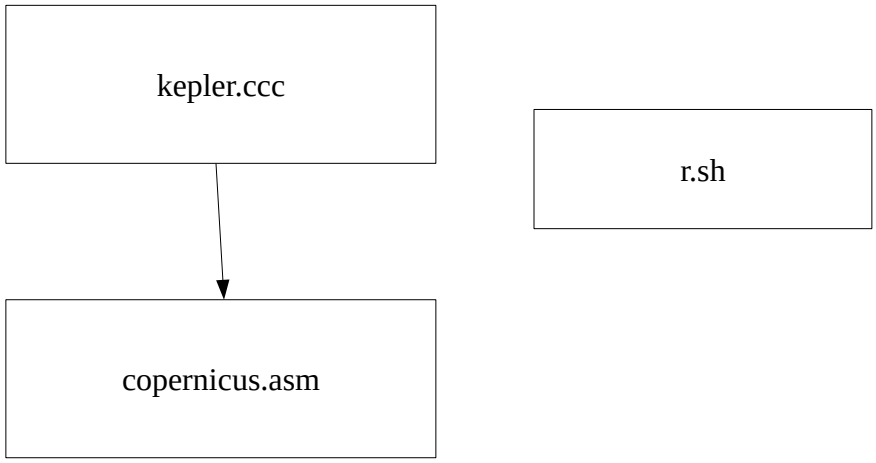
q_2 is the electric charge on particle #2 measured in Coulombs

r is the distance between the two particles measured in meters

k is a fixed constant with value 8.99×10^9 (units omitted)

Other people in the lab room will ask you to compute the F value accurately.

System diagra



For this programming test there is no gdb. The next midterm program test will be loaded with gdb.

You may choose to make the kepler file in either C++ or C language.

Sample dialog.

Welcome to High Voltage System Programming brought to you by Heinrick Hertz

This program will help you find the force

Please enter the electrical charge on particle 1: 2.8

Please enter the electrical charge on particle 2: 3.6

Please enter the distance between the particles in meters: 1259.8

Please enter your last name: Copernicus II

Please enter your title: Senior researcher

Thank you. Your force is 57097.48982 Neutons.

Goodbye Senior researcher. Have a nice research party.

Zero will be returned to the operating system.

Color codes

Yellow: Input from the keyboard

Blue: Output from the driver

Green: Output from the assembly module

Replace Mr Hertz's name with your own name.

Coulomb's law gives you the equation to use:

$$F = k \times q_1 \times q_2 / r^2$$

Show a lot of digits of precision in your numeric output.

q_1 and q_2 are electrical charge quantities. They can be positive or negative.

K is the constant 8.99×10^9 , which is equal to 0x4200BEC41C000000. You use the form of the number that works best for you.

When you're done.

Go back and place the ID comments in the three files

Place comments, one per block, in the asm file.

Make sure it runs in a Linux environment.

Professional style documentation is not required for an academic test.

Make sure there are no pdf files involved.

Send me the set of 3 files as attachments to an email sent to holliday@fullerton.edu

Last minute for submission: 4:59pm

You're done.