24780 Engineering Computation: Problem Set 11

(*) In the following instructions (and in all course materials), substitute your Andrew ID wherever you see *yourAndrewId*.

You need to create a ZIP file (which may appear as a compressed folder in Windows) and submit the ZIP file via the 24-780 Canvas. The filename of the ZIP file must be:

```
PS11-YourAndrewID.zip
```

For example, if your Andrew account is hummingbird@andrew.cmu.edu, the filename must be:

```
PS11-hummingbird.zip
```

Failure to comply with this naming rule will result in an automatic 5% deduction from this assignment's credit. If we cannot identify the submitter of the file, an additional 5% credit will be lost. If we are ultimately unable to connect you with the submitted ZIP file, you will receive 0 points for this assignment. Therefore, ensure strict adherence to this naming rule before submitting a file.

The ZIP file must be submitted to the 24-780 Canvas. If you find a mistake in a previous submission, you can re-submit the ZIP file with no penalty as long as it's before the submission deadline.

Your Zip file should contain only:

- ps11.cpp
- noerror.png or noerror.jpg. A screenshot from the compiler server showing there is no error either in .png or .jpg format.

Do not include project files and intermediate files generated by the compiler. But, do not worry about some files or directories that are automatically added by the archiver (__MACOSX__ file for example).

Ensure that your program can be compiled without errors on one of the compiler servers. Do not wait until the last minute, as the compiler servers may become very busy just minutes before the submission deadline!

Submission Due: Please refer to Canvas.

START EARLY!

Unless you are a good programmer, there is no way to finish the assignment overnight.

Crank Path Simulation [ps11.cpp] (100 pts)

Write a program (ps11.cpp) that simulates and visualizes the motion of a crank. Schematic of the crank is shown in Fig.1.

The crank consists of three shafts, the first shaft is 1m long and rotates around the origin counter clockwise. The other end of the first shaft is P1, where the second shaft is connected. The second shaft is 4m long, and connects P1 and P2. The third shaft is 2m long, and connects P2 and P3. P3 is at (L,0), and the third shaft rotates around P3. The distance between P0 and P3 is 4m (L=4).

For the same shafts, there are two possible locations of P2. In your program take the one that makes y2 greater (higher).

Your program needs to draw:

- three shafts, and
- the path of the mid point of P1 and P2.

To draw the path of the mid point of P1 and P2, sample at least 60 points, and use GL_LINE_LOOP.

The origin of the simulation environment should be at pixel coordinate (100,500). Scale up 1m to 100 pixels.

Animate the image by rotating the first shaft at 0.01 radian per iteration. Add FsSleep(10); after each frame.

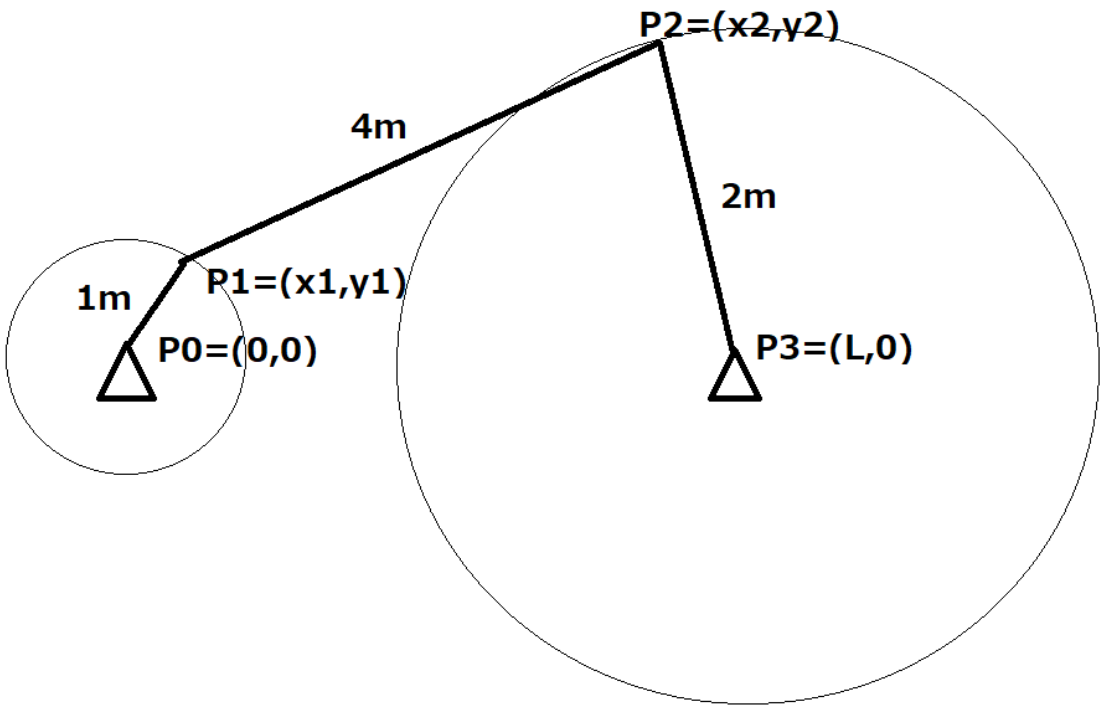

Fig. 1: Schematic

Test Your Program with One of the Compiler Servers

Test your program with one of the following compiler servers:

```
http://freefood1.lan.local.cmu.edu
http://freefood2.lan.local.cmu.edu
http://freefood3.lan.local.cmu.edu
http://freefood4.lan.local.cmu.edu
```

You need to make sure you are not getting any errors (red lines) from the compiler server.

It is a good practice to remove warnings as well. However, we will not take points off for warnings as long as your program satisfies requirements of the assignment.

You can only access these servers from CMU network. If you need to access from your home, use CMU VPN. Please visit the CMU computing services web site how to install the VPN.