

Winter 2022
Due Jan 31st
(11:59pm NL time)

Computer Science 1510 Problem set #2

See “Submission Details for Problem Sets and Lab Problems” under “Important Links” on the class webpage for details on how to submit your solutions.

For this Problem Set you should upload your .f90 files.

1. Write a Fortran program that, given two points (x_1, y_1) and (x_2, y_2) (obtained from the user), computes and displays the slope-intercept form of the line passing through the two points, ie. $y = mx + b$. For example, if $(3, 4)$ and $(7, 9)$ are entered, the output of your program may look like:

Equation: $y = 1.25\ x + 0.25$

In the case of a vertical line, the output of your program may look like:

Line is vertical
Equation: $x = 2.0$

In the case of a horizontal line, the output of your program may look like:

Line is horizontal
Equation: $y = 4.0$

Note that the format of your output does not have to be exactly as shown above. You should name your file `line_eqn.f90`.

2. A toll bridge charges \$14.00 for passenger cars, \$18.00 for buses, \$17.00 for trucks up to 14,000 pounds, and \$25.00 for trucks over 14,000 pounds. Write a Fortran program to output the appropriate toll for a given user input (`C` for car, `B` for bus, or `T` for truck). If `T` is entered, prompt the user for a character `<` (for less or equal to 14,000 pounds), or `>` (for greater than 14,000 pounds). The program should use a `SELECT CASE` statement for the type of vehicle. You should name your file `toll_amt.f90`.
3. Calculate the inverse of Euler’s Number $1/e$ using the partial sum

$$\tilde{e} = \sum_{k=0}^N \frac{(-1)^k}{k!}.$$

How many terms `N` are needed?

Compare the result to `EXP(-1.)`. If the results match, bonus points will be added.