MATLAB Programming NCTU Fall 2022 LAB#01 2022/9/20

For this lab, the goal is just to get familiar with some basic operations covered in the class. There are a few short practices. Notes:

(1) **No loop** to be used.

(2) Use only functions mentioned in the class so far, unless noted otherwise.

(3) Save your code in script files (`*.m`) for easy testing/debugging.

Practices:

1. Given a vector v of length 4 representing two fractal numbers, give the text output of its fractal sum:

Example: v: `3 7 5 2` Your output: `3/7+5/2=41/14`

Note: Use `fprintf` for this task.

2. Compute `1/1 + 1/2 + 1/3 + ... + 1/999 + 1/1000`.

3. Compute `1 + 1/1! + 1/2! + 1/3! + ... + 1/100!`. (Note: `cumprod` is useful here.) Compare the result with `exp(1)`.

4. Make `n`x`n` matrices (`n` given in a variable) that look like all zeros surrounded by a layer of ones. Try with different `n` to make sure your code is correct. Example for `n`=5:

```
1 1 1 1 1
1 0 0 0 1
1 0 0 0 1
1 0 0 0 1
1 1 1 1 1
```

Next, modify your code so that there are two layers (instead of one) of ones along the border of the square.

5. Make `n`x`n` diagonal matrices (`n` given in a variable) whose diagonal values are 1 to `n`. (Note: Do not use the `diag` function for this exercise. First determine the linear indices of the diagonal elements, and then assign `1:n` to them.) Example for `n`=5:

```
1 0 0 0 0
0 2 0 0 0
0 0 3 0 0
0 0 0 4 0
0 0 0 0 5
```

6. Implement the functionality of the function `meshgrid` yourself. First check the documentation of `meshgrid` and also call it from the command window to see the generated matrices from given input vectors. Note: Use `repmat` in your implementation.

(You do not need to write a function here; just write your own statements to generate the output matrices from the input vectors. Use only the form of meshgrid for 2-D grids, with two input vectors x and y, and two output matrices X and Y.)