

Exam #2 sample problems, Math 445, University of New Hampshire, fall 2014

1. Write a Matlab `factorial` function that uses a `for` loop to compute the factorial $n!$ of its argument n , according to the formula

$$n! = n \cdot (n - 1) \cdot (n - 2) \cdot (n - 3) \dots 3 \cdot 2 \cdot 1 = \prod_{k=1}^n k$$

Make sure that it computes $0! = 1$ correctly.

2. The factorial $n!$ is defined for non-negative n . Revise your answer to problem 1 to check if n is negative. If it is, print an error message of the form “error: factorial(n) is not defined for n = -6” (where -6 is the value of the argument n) and return not-a-number.

3. Solve problem 1 using a `while` loop instead of a `for` loop.

4. Write a Matlab `myexp(x,N)` function that computes the exponential function e^x using a `for` loop to sum the first N terms of its Taylor series expansion

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}$$

You can use your `factorial` function from problem 1.

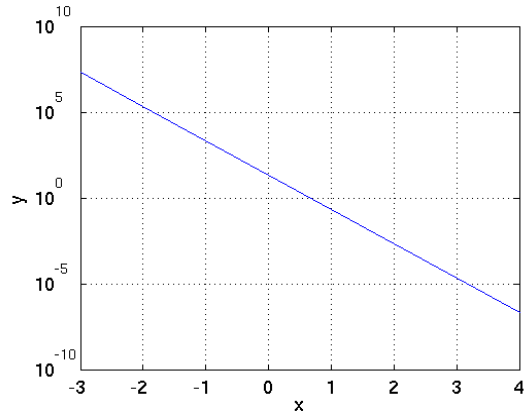
5. Use Matlab’s anonymous function facility to define a scalar function `f` that evaluates $f(x) = x^2 + 3x + 2$.

6. Use matlab’s anonymous function facility to define a vector function `f` that evaluates

$$f \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2x + y \\ x^2 + y^2 \end{pmatrix}$$

7. Write a Matlab `abs` function that returns the absolute value $|x|$ of its argument x (without referring to Matlab’s `abs` function, of course!).

8. What is y as a function of x ?



9. What is y as a function of x ?

