1. Consider the finite difference approximation

$$f'(x) \approx \frac{1}{2h}[-3f(x) + 4f(x+h) - f(x+2h)]$$

for $f(x) = e^x$ at the point $x = 1$. Using the matlab function `Num_der_err.m` to fill in the Table 1. Then compute the convergence order based on the formula

$$\text{order} = \log_2\left(\frac{Err_h}{Err_{h/2}}\right)$$

h	Err_h	$Err_{h/2}$	order
0.1	0.098	0.0024	2.0548
0.01	9.1292e-05	2.2737e-05	2.0054
0.001	9.0678e-07	2.2661e-07	2.005
0.0001	9.0697e-09	2.2729e-09	1.9965

2. *Consider the polynomial interpolation on the interval* $[-1, 1]$ with two types of $f(x)$:

$$f_1(x) = \sin(x), \qquad f_2(x) = \frac{1}{1+25x^2}.$$

The matlab script for polynomial interpolation of $f_1(x)$ is given by `Err_f1.m`. Try to revise the matlab script to $f_2(x)$ and fill in the Table 2.

Hint: Using the element-wise division `./` and the element-wise power `.^`

n	$f_1(x)$		$f_2(x)$	
	Vandermonde Err	Lagrange Err	Vandermonde Err	Lagrange Err
5	6.9967e-05	6.9967e-05	112.0662	2.0662
10	8.7900e-10	8.7895e-10	8.2077	8.2077
20	4.7063e-09	5.4384e-13	168.5423	168.5423
40	2.0079	1.0558e-07	1.9346e+05	1.9346e+05