정보통신 수학 및 실습
Lab assignment

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Chapter 5 Lab Assignment

1. Let $y = 10x^4$

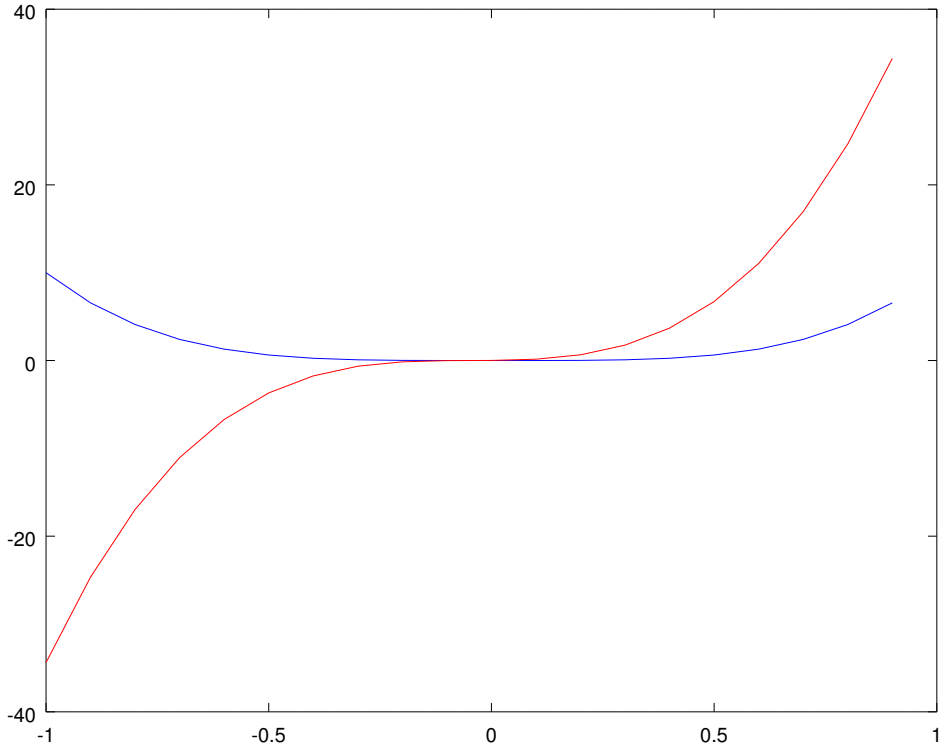
a) Find y' using the numeric tools of MATLAB.

```
>> syms 'x'
>> diff(10*x**4)
ans = (sym)

       3
40  x
```

b) Plot y and y' when $-1 < x < 1$ using a single plot command.

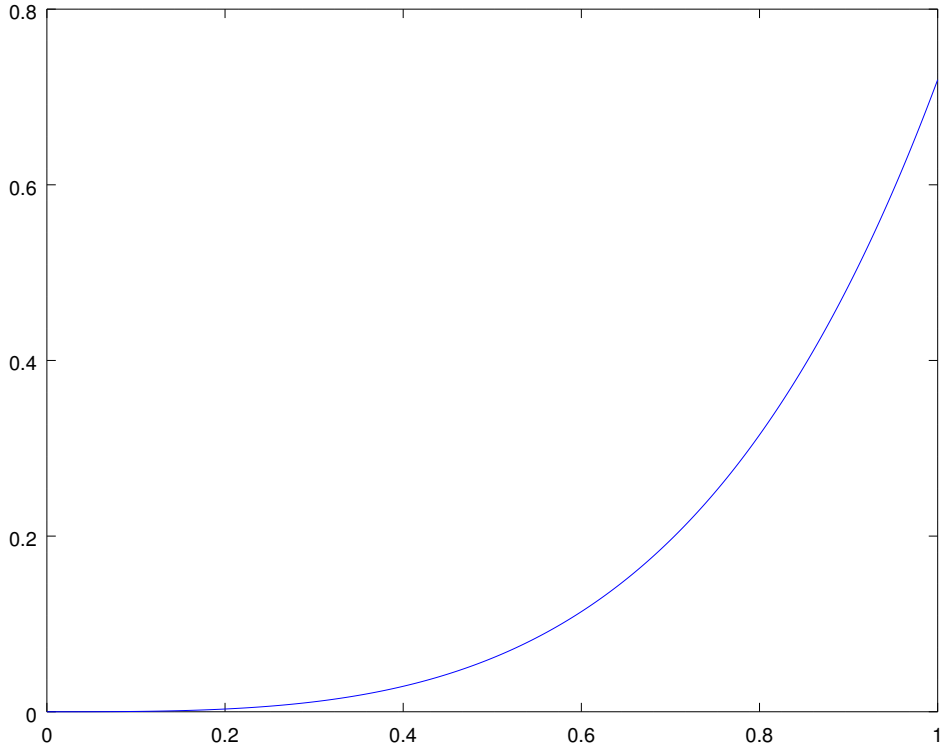
```
x = [−1:0.1:1];
y = 10*x .**4;
yp = diff(y) /0.1;
x = x(1:20) ;
y= y(1:20)
plot(x,y,x,yp,'r')
```



2. Let $z = ydx = x^2e^x dx$ and z(0)=0.

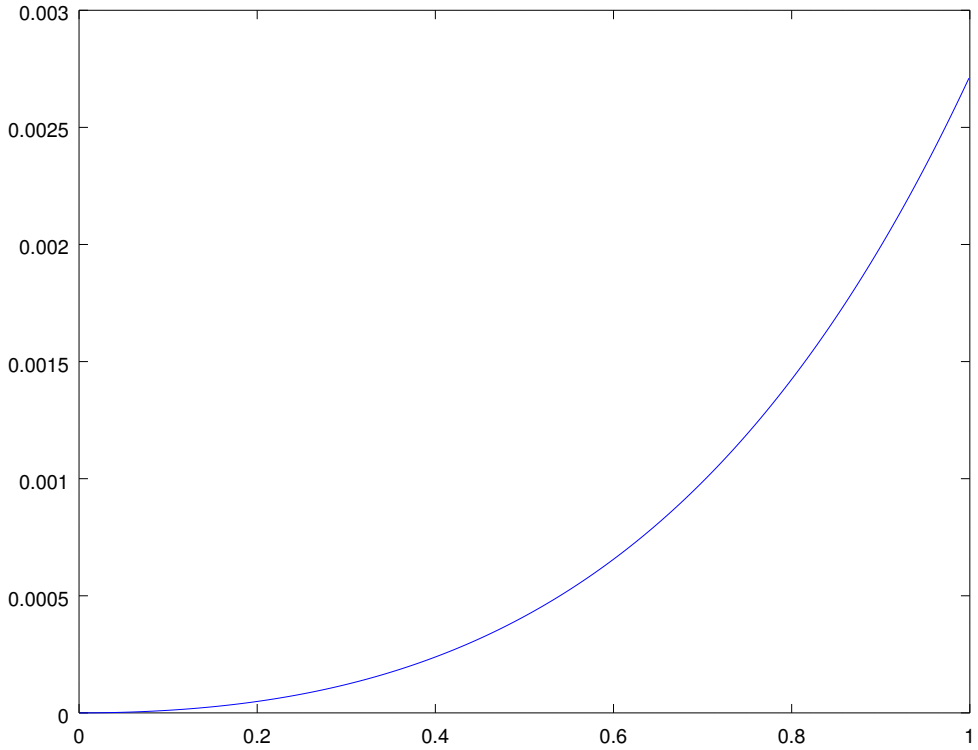
a) Find z using the numeric tools of MATLAB when $0 < x < 1$.

```
x = linspace (0,1,1001) ;
y = x .**2.* exp(x);
plot(x,y)
```



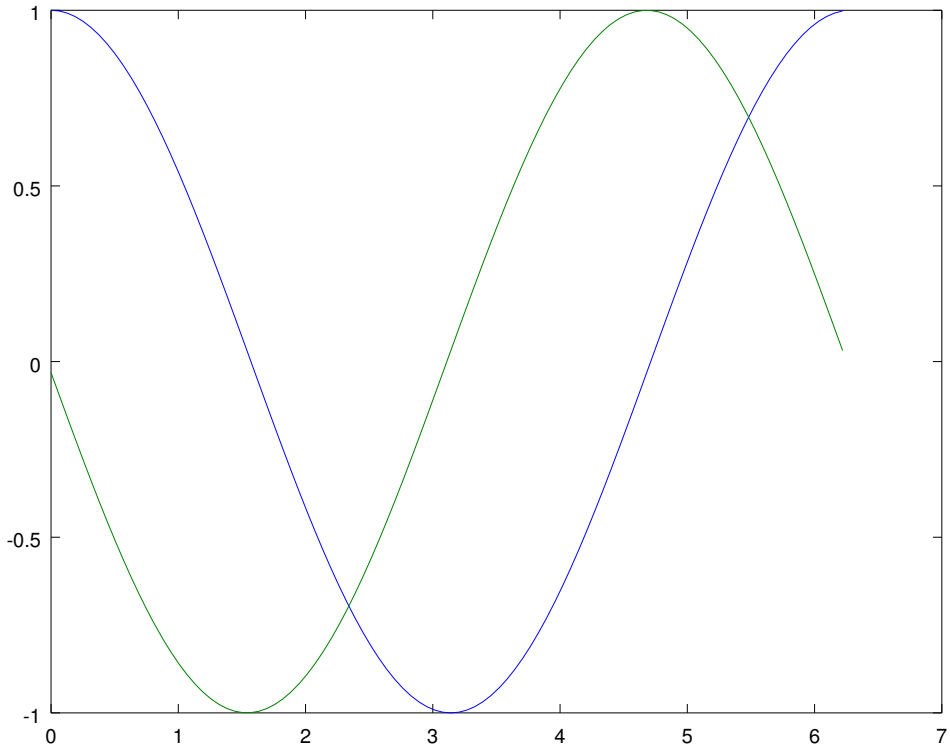
b) Plot y and z when $0 < x < 1$**.**

```
x = linspace (0,1,1001) ;
y = x .**2.* exp(x);
z = y(1:1000) .* diff(x);
plot(x(1:1000) ,z)
```



3. Let y = cos x, determine numerical derivative based on 101 points in one cycle and plot y' and (-sinx).

```
x = linspace(0, 2*pi, 101);
y = cos(x);
yp = diff(y) ./ diff(x);
plot(x(1:100), y(1:100), x(1:100), yp)
```



4. **A test is performed on a mechanical part and the acceleration versus time is measured and shown as follows. Use MATLAB to determine and plot the velocity and displacement as a function of time.**

   Remember that velocity = ∫ acceleration dt, and displacement = ∫ velocity dt.

t, s	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
a, m/s^2	0	9.05	16.37	22.22	26.81	30.33	32.93	34.76	35.95	36.59
1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
36.79	36.62	36.14	35.43	34.52	33.47	32.30	31.06	29.75	28.42	27.07

```
t = [0:0.1:2];
a =[0,9.05,16.37,22.22,26.81,30.33,32.93,34.76,35.95,36.59,
   36.79,36.62,36.14,35.43,34.52,33.47,32.30,
```

```
    31.06,29.75,28.42,27.07];
v = 0.1 * cumsum(a);
s = 0.1 * cumsum(v);
plot(t,a, t,v, t,s)
```