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LAB REPORT- 01 & 02

Course Title : Numerical Analysis Lab

Course Code : CSE 224

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Section : 10

Program : B.Sc. Engg. in CSE

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Task 1: With *x* 5 and *y* = 2, compute the following quantities:

- **u = x + y v=*xy* w = *x/y* z = w3**

- **s = xy2/(x − y) p=*3x*/2y r = 3xy/2 t = x5/(x5 − 1)**

Solve:

```
x =5
y = 2
>> u = x+y
u = 7
>> w = x/y
w = 2.5000
>> z = w^3
z = 15.625
>> s = (x*y^2 )/(x-y)
s = 6.6667
>> p=3*x/2*y
p = 15
>> r = 3*x*y/2
r = 15
>> t=x^5/(x^5 -1)
t = 1.0003
```

Task 2: With *x* = 10 and *y* = 3, compute the following quantities:

- **r = 8 sin(y) s = 5 sin(2y) z = sin(x)**
- **w = 2(sin(x))/5 p= e2-1 u = 2+ cos(2πx) *м*= √x+4+ sin(0.2π) + *e2***

Solve:

```
x1=10
x1 = 10
>> y1=3
y1 = 3
>> r=8*sin(y1)
r = 1.1290
>> s=5*sin(2*y)
s = -3.7840
>> z=sin(x1)
z = -0.5440
>> w=2*(sin(x1))/5
w = -0.2176
```

```
>> p=e^x1-1
p = 2.2025e+04

>> u=2+cos(2*pi*x1)
u = 3
>> m=sqrt(x1)+4+sin(0.2*pi)+e^2
m = 15.139
```

<u>Task 3:</u> With *x*= 3 and *y* = 4, compute the following quantities:

- **3/2xy**
- **(1-1/x^5)^-1**
- **4(y-5)/(3x-6)**

<u>Solve:</u>

```
>> x2=3
x2 = 3
>> y2=4
y2 = 4
>> (3/2)*x2*y2
ans = 18
>> (1-(1/x2^5))^-1
ans = 1.0041
4*(y2-5)/(3*x2-6)
ans = -1.3333
```

<u>Task 4:</u> Then compute the same quantities as above with:

- **X=[3 1 0] and y=[0 1 1] Vector element-by-element Arithmetics**

x= $\begin{pmatrix} -3 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$ **and**

y= $\begin{pmatrix} 1 & 1 & 1 \\ 2 & 0 & -2 \end{pmatrix}$

Array *element-by-element* Arithmetics

Solve:

```
>> x4=[3 1 0]
x4 =

   3   1   0

>> y4=[0 1 1]
y4 =

   0   1   1


>> x4+y4
ans =

   3   2   1

>> x4-y4
ans =

   3   0  -1

>> x4.*y4
ans =

   0   1   0

>> x4/y4
ans = 0.5000
>> x5=[-3 1 0;1 0 1]
x5 =

  -3   1   0
   1   0   1



>> y5=[1 1 1 ; 2 0 -2]
```

```
y5 =

   1   1   1
   2   0  -2
>> x5+y5
ans =

  -2   2   1
   3   0  -1

>> x5-y5
ans =

  -4   0  -1
  -1   0   3




>> x5.*y5
ans =

  -3   1   0
   2   0  -2

>> x5/y5
ans =

  -6.6667e-01  -7.5000e-01
   6.6667e-01  -3.9252e-17
```

Task 5:

Using only ranged array declaration and concatenation, formulate the following matrix:

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 9 & 7 & 5 & 3 & 1 & -1 & -3 \\ 4 & 8 & 16 & 32 & 64 & 128 & 256 \end{bmatrix}$$

Solve:

```
>> x=[2,4,8,16,32,64,128]
```

```
x =

    2    4    8   16   32   64  128

>> y=2.*x

y =

    4    8   16   32   64  128  256

>> A=[1:1:7;9:-2:-3;y]

A =

    1    2    3    4    5    6    7
    9    7    5    3    1   -1   -3
    4    8   16   32   64  128  256
```

Task 6:

Evaluate the function

$$y = \frac{x}{x + \frac{1}{x^2}}$$

for $x = 3$ to $x = 5$ in step of 0.01 and make its plot.

Solve:

```
>>  x=[3:0.01:5]


 Columns 1 through 13:

   3.0000   3.0100   3.0200   3.0300   3.0400   3.0500   3.0600   3.0700   3.0800   3.0900
3.1000   3.1100   3.1200

 Columns 14 through 26:

   3.1300   3.1400   3.1500   3.1600   3.1700   3.1800   3.1900   3.2000   3.2100   3.2200
3.2300   3.2400   3.2500

 Columns 27 through 39:

   3.2600   3.2700   3.2800   3.2900   3.3000   3.3100   3.3200   3.3300   3.3400   3.3500
3.3600   3.3700   3.3800

 Columns 40 through 52:
```

3.3900 3.4000 3.4100 3.4200 3.4300 3.4400 3.4500 3.4600 3.4700 3.4800 3.4900 3.5000 3.5100

Columns 53 through 65:

3.5200 3.5300 3.5400 3.5500 3.5600 3.5700 3.5800 3.5900 3.6000 3.6100 3.6200 3.6300 3.6400

Columns 66 through 78:

3.6500 3.6600 3.6700 3.6800 3.6900 3.7000 3.7100 3.7200 3.7300 3.7400 3.7500 3.7600 3.7700

Columns 79 through 91:

3.7800 3.7900 3.8000 3.8100 3.8200 3.8300 3.8400 3.8500 3.8600 3.8700 3.8800 3.8900 3.9000

Columns 92 through 104:

3.9100 3.9200 3.9300 3.9400 3.9500 3.9600 3.9700 3.9800 3.9900 4.0000 4.0100 4.0200 4.0300

Columns 105 through 117:

4.0400 4.0500 4.0600 4.0700 4.0800 4.0900 4.1000 4.1100 4.1200 4.1300 4.1400 4.1500 4.1600

Columns 118 through 130:

4.1700 4.1800 4.1900 4.2000 4.2100 4.2200 4.2300 4.2400 4.2500 4.2600 4.2700 4.2800 4.2900

Columns 131 through 143:

4.3000 4.3100 4.3200 4.3300 4.3400 4.3500 4.3600 4.3700 4.3800 4.3900 4.4000 4.4100 4.4200

Columns 144 through 156:

4.4300 4.4400 4.4500 4.4600 4.4700 4.4800 4.4900 4.5000 4.5100 4.5200 4.5300 4.5400 4.5500

Columns 157 through 169:

4.5600 4.5700 4.5800 4.5900 4.6000 4.6100 4.6200 4.6300 4.6400 4.6500 4.6600 4.6700 4.6800

Columns 170 through 182:

4.6900 4.7000 4.7100 4.7200 4.7300 4.7400 4.7500 4.7600 4.7700 4.7800 4.7900 4.8000 4.8100

Columns 183 through 195:

4.8200 4.8300 4.8400 4.8500 4.8600 4.8700 4.8800 4.8900 4.9000 4.9100 4.9200 4.9300 4.9400

Columns 196 through 201:

4.9500 4.9600 4.9700 4.9800 4.9900 5.0000

>> y = (x./(x.+((x.^2).^-1)))

Columns 1 through 13:

0.9643 0.9646 0.9650 0.9653 0.9656 0.9660 0.9663 0.9666 0.9669 0.9672 0.9675 0.9678 0.9681

Columns 14 through 26:

0.9684 0.9687 0.9690 0.9693 0.9696 0.9698 0.9701 0.9704 0.9707 0.9709 0.9712 0.9714 0.9717

Columns 27 through 39:

0.9719 0.9722 0.9724 0.9727 0.9729 0.9732 0.9734 0.9736 0.9739 0.9741 0.9743 0.9745 0.9748

Columns 40 through 52:

0.9750 0.9752 0.9754 0.9756 0.9758 0.9760 0.9762 0.9764 0.9766 0.9768 0.9770 0.9772 0.9774

Columns 53 through 65:

0.9776 0.9778 0.9780 0.9781 0.9783 0.9785 0.9787 0.9788 0.9790 0.9792 0.9794 0.9795 0.9797

Columns 66 through 78:

0.9798 0.9800 0.9802 0.9803 0.9805 0.9806 0.9808 0.9809 0.9811 0.9812 0.9814 0.9815 0.9817

Columns 79 through 91:

0.9818 0.9820 0.9821 0.9822 0.9824 0.9825 0.9826 0.9828 0.9829 0.9830 0.9832 0.9833 0.9834

Columns 92 through 104:

0.9835 0.9837 0.9838 0.9839 0.9840 0.9842 0.9843 0.9844 0.9845 0.9846 0.9847 0.9848 0.9850

Columns 105 through 117:

0.9851 0.9852 0.9853 0.9854 0.9855 0.9856 0.9857 0.9858 0.9859 0.9860 0.9861 0.9862 0.9863

Columns 118 through 130:

0.9864 0.9865 0.9866 0.9867 0.9868 0.9869 0.9870 0.9871 0.9871 0.9872 0.9873 0.9874 0.9875

Columns 131 through 143:

0.9876 0.9877 0.9877 0.9878 0.9879 0.9880 0.9881 0.9882 0.9882 0.9883 0.9884 0.9885 0.9886

Columns 144 through 156:

0.9886 0.9887 0.9888 0.9889 0.9889 0.9890 0.9891 0.9891 0.9892 0.9893 0.9894 0.9894 0.9895

Columns 157 through 169:

0.9896 0.9896 0.9897 0.9898 0.9898 0.9899 0.9900 0.9900 0.9901 0.9902 0.9902 0.9903 0.9903

Columns 170 through 182:

0.9904 0.9905 0.9905 0.9906 0.9906 0.9907 0.9908 0.9908 0.9909 0.9909 0.9910 0.9910 0.9911

Columns 183 through 195:

0.9911 0.9912 0.9913 0.9913 0.9914 0.9914 0.9915 0.9915 0.9916 0.9916 0.9917 0.9917 0.9918

Columns 196 through 201:

0.9918 0.9919 0.9919 0.9920 0.9920 0.9921

>> plot(x,y,'r:s')

Graph: