DIGITAL ASSIGNMENT – 5

FALL SEMESTER : 2018-19

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Slot: L-5+L-6

Course Name: CALCULUS FOR ENGINEERS (MATLAB)

Course Code: MAT1011

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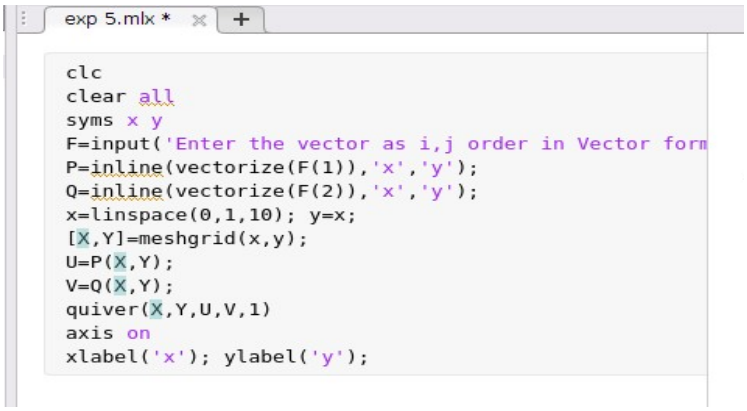
Date: 08/10/2018

QUESTION 1.

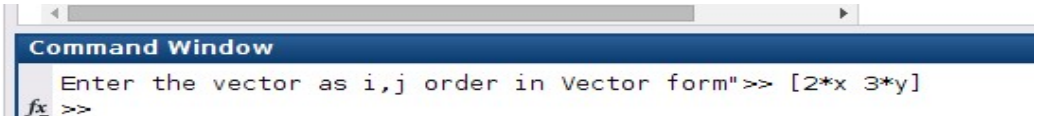
Draw the two dimensional vector field for the vector 2x***i***+3y***j***.

SOLUTION:

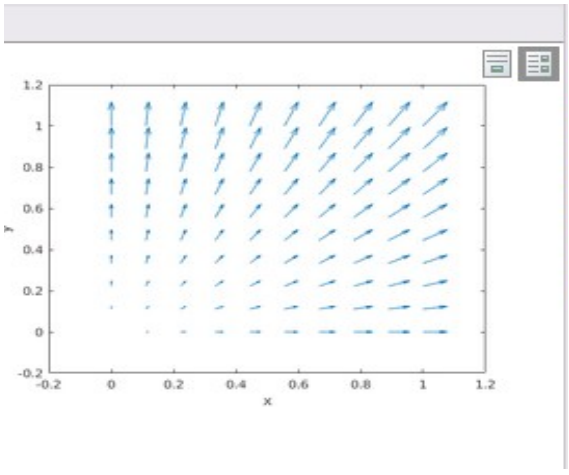
CODE:



INPUT:



OUTPUT:



QUESTION 2.

Find the Gradient of the function *f=x^2*y^3 - 4*y*

SOLUTION:

CODE:

```
untitled3.m
clc
clear all
syms x y
f=input('Enter the function f(x,y):');
grad=gradient(f,[x,y])
f1=diff(f,x);
f2=diff(f,y);
P=inline(vectorize(f1),'x','y');
Q=inline(vectorize(f2),'x','y');
x=linspace(-2,2,10);
y=x;
[X,Y]=meshgrid(x,y)
U=P(X,Y);
V=Q(X,Y);
quiver(X,Y,U,V,1);
axis on
xlabel('x'); ylabel('y');
hold on
ezcontour(f,[-2,2])
```

INPUT:

```
Command Window
Enter the function f(x,y):(x^2)*(y^3)-4*y
```

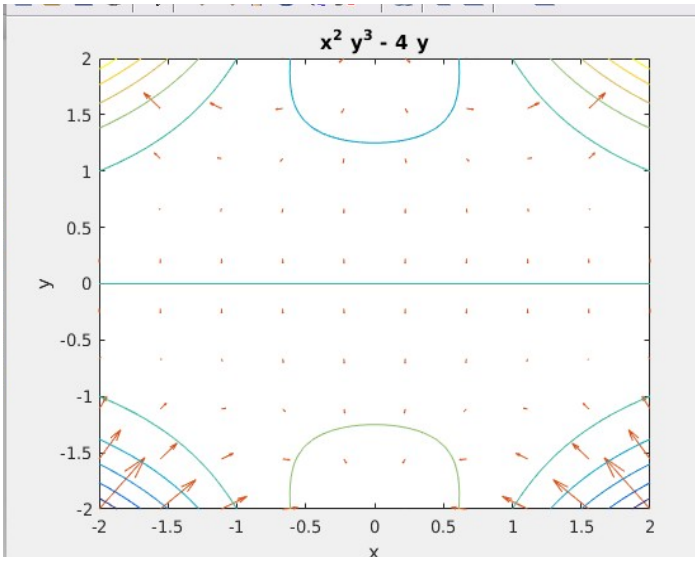
OUTPUT:

```
grad =

        2*x*y^3
 3*x^2*y^2 - 4
```

```
X =

  Columns 1 through 8

   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111
   -2.0000   -1.5556   -1.1111   -0.6667   -0.2222    0.2222    0.6667    1.1111

  Columns 9 through 10

    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
    1.5556    2.0000
```

```
Y =

  Columns 1 through 8

   -2.0000   -2.0000   -2.0000   -2.0000   -2.0000   -2.0000   -2.0000   -2.0000
   -1.5556   -1.5556   -1.5556   -1.5556   -1.5556   -1.5556   -1.5556   -1.5556
   -1.1111   -1.1111   -1.1111   -1.1111   -1.1111   -1.1111   -1.1111   -1.1111
   -0.6667   -0.6667   -0.6667   -0.6667   -0.6667   -0.6667   -0.6667   -0.6667
   -0.2222   -0.2222   -0.2222   -0.2222   -0.2222   -0.2222   -0.2222   -0.2222
    0.2222    0.2222    0.2222    0.2222    0.2222    0.2222    0.2222    0.2222
    0.6667    0.6667    0.6667    0.6667    0.6667    0.6667    0.6667    0.6667
    1.1111    1.1111    1.1111    1.1111    1.1111    1.1111    1.1111    1.1111
    1.5556    1.5556    1.5556    1.5556    1.5556    1.5556    1.5556    1.5556
    2.0000    2.0000    2.0000    2.0000    2.0000    2.0000    2.0000    2.0000

  Columns 9 through 10

   -2.0000   -2.0000
   -1.5556   -1.5556
   -1.1111   -1.1111
   -0.6667   -0.6667
   -0.2222   -0.2222
    0.2222    0.2222
    0.6667    0.6667
    1.1111    1.1111
    1.5556    1.5556
    2.0000    2.0000
```

FIGURE:



QUESTION 3.

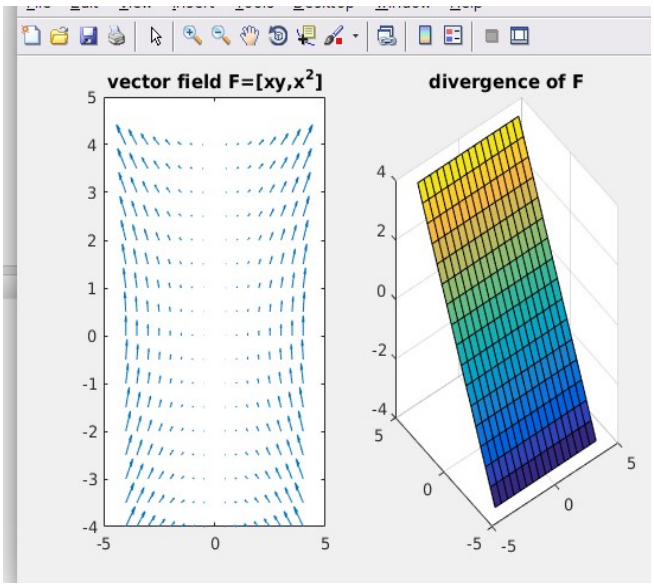
Find the Divergence of a vector field *f=[xy , x^2]*.

SOLUTION:

CODE:

```
clc
clear all
X=-4:0.5:4; Y=X;
[x,y]=meshgrid(X,Y);
div1=divergence(x,y,x.*y,x.^2);
figure;
subplot(1,2,1);
quiver(x,y,x.*y,x.^2);
title('vector field F=[xy,x^2]');
subplot(1,2,2);
surf(x,y,div1);
title('divergence of F');
```

FIGURE/OUTPUT:



QUESTION 4.

Visualise the Curl of a vector function *f=[yz, 3zx, z]*.

SOLUTION:

CODE:

```
clc
clear all
X=-4:4; Y=X; Z=Y;
[x,y,z]=meshgrid(X,Y,Z);
[cx,cy,cz]=curl(x,y,z,y.*z,3.*z.*x,z);
figure;
subplot(1,2,1);
quiver3(x,y,z,cx,cy,cz);
title('3-D view of Curl');
subplot(1,2,2);
quiver(x,y,(y.*z),3.*z.*x);
title('2-D view of Curl');
```

FIGURE/OUTPUT: