MAT1011 – Calculus for Engineers (MATLAB), Fall Semester 2020-2021

Digital Assignment SL. 9, Experiment – 5A: Divergence, Curl and Gradient and visualization of vector field

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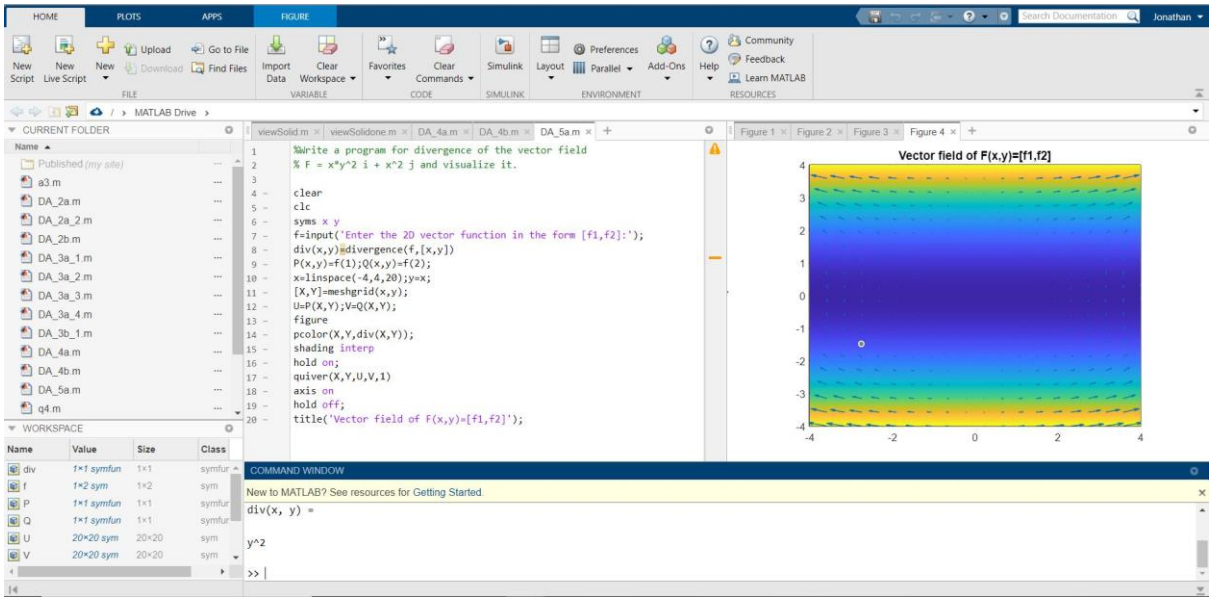
Q1) Write a program for divergence of the vector field F = x*y^2 I + x^2 j and visualize it.

A: Code is as follows:

```
%Write a program for divergence of the vector field
% F = x*y^2 i + x^2 j and visualize it.


clear
clc
syms x y
f=input('Enter the 2D vector function in the form [f1,f2]:');
div(x,y)=divergence(f,[x,y])
P(x,y)=f(1);Q(x,y)=f(2);
x=linspace(-4,4,20);y=x;
[X,Y]=meshgrid(x,y);
U=P(X,Y);V=Q(X,Y);
figure
pcolor(X,Y,div(X,Y));
shading interp
hold on;
quiver(X,Y,U,V,1)
axis on
hold off;
title('Vector field of F(x,y)=[f1,f2]');
```

Output (via Command Window):

```
Enter the 2D vector function in the form [f1,f2]:
[x*y^2, x^2]


div(x, y) =

y^2
```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PLOTS
APPS
FIGURE
Search Documentation
Jonathan
New Script
New Live Script
New
Upload
Download
Go to File
Find Files
Import Data
Clear Workspace
Favorites
Clear Commands
Simulink
Layout
Preferences
Parallel
Add-Ons
Help
Community
Feedback
Learn MATLAB
FILE
VARIABLE
CODE
SIMULINK
ENVIRONMENT
RESOURCES
MATLAB Drive
CURRENT FOLDER
Name
Published (my site)
a3.m
DA_2a.m
DA_2a_2.m
DA_2b.m
DA_3a_1.m
DA_3a_2.m
DA_3a_3.m
DA_3a_4.m
DA_3b_1.m
DA_4a.m
DA_4b.m
DA_5a.m
q4.m
WORKSPACE
Name
Value
Size
Class
div
1×1 symfun
1×1
symfun
f
1×2 sym
1×2
sym
P
1×1 symfun
1×1
symfun
Q
1×1 symfun
1×1
symfun
U
20×20 sym
20×20
sym
V
20×20 sym
20×20
sym
viewSolid.m
viewSolidone.m
DA_4a.m
DA_4b.m
DA_5a.m
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x=linspace(-4,4,20);y=x;
[X,Y]=meshgrid(x,y);
U=P(X,Y);V=Q(X,Y);
figure
pcolor(X,Y,div(X,Y));
shading interp
hold on;
quiver(X,Y,U,V,1)
axis on
hold off;
title('Vector field of F(x,y)=[f1,f2]');
Figure 1
Figure 2
Figure 3
Figure 4
Vector field of F(x,y)=[f1,f2]
4
3
2
1
0
-1
-2
-3
-4
-4
-2
0
2
4
COMMAND WINDOW
New to MATLAB? See resources for Getting Started.
div(x, y) =
y^2
>>
