

MATLAB-EXPERIMENT 4B

TRIPLE INTEGRALS



march 26, 2021

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MAT 1011 – Calculus for Engineers (MATLAB)

Experiment 4-B

TRIPLE INTEGRALS

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**Question 1:**

**Find the volume of the region bounded between the planes x + y + 2z = 2 and 2x + 2y + z = 4 in the first octant.**

**CODES:**

close all;

clear;

clc;

% to find triple integral over a region

syms x y z;

%specifying the limit of integrals wrt x,y,z

lower\_x = 0;

upper\_x = 2;

lower\_y = 0 + 0 \* x;

upper\_y = 2 - x;

lower\_z = (2 - x - y)/2;

upper\_z = 2\*(2 - x - y);

%calculating the triple integral which gives the volume enclosed

volume = int(int(int(1 + 0\*z, z, lower\_z, upper\_z), y, lower\_y, upper\_y),x, lower\_x, upper\_x);

%displaying the volume enclosed

disp("The volume bounded by x + y + 2z = 2, 2x + 2y + z = 2 and first octane is = ");

disp(volume);

%displaying the 3D plot

figure(1)

viewSolidone(z, lower\_z, upper\_z, y, lower\_y, upper\_y, x, lower\_x, upper\_x);

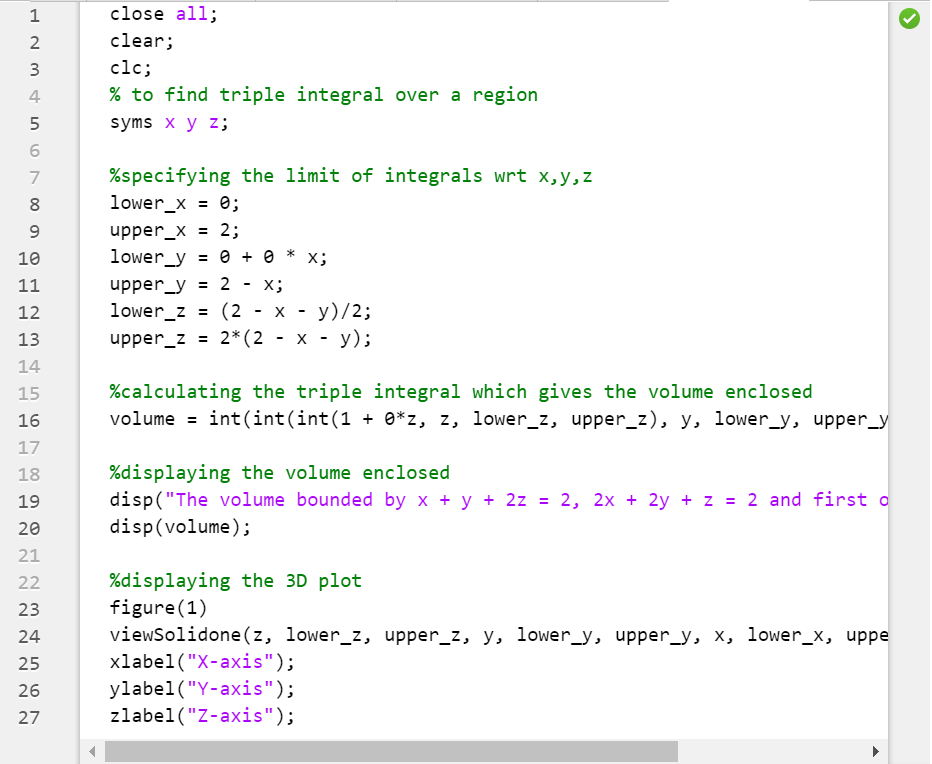
xlabel("X-axis");

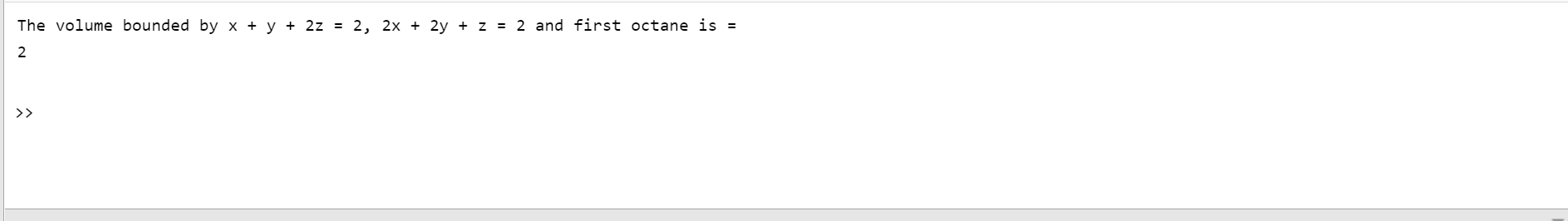
ylabel("Y-axis");

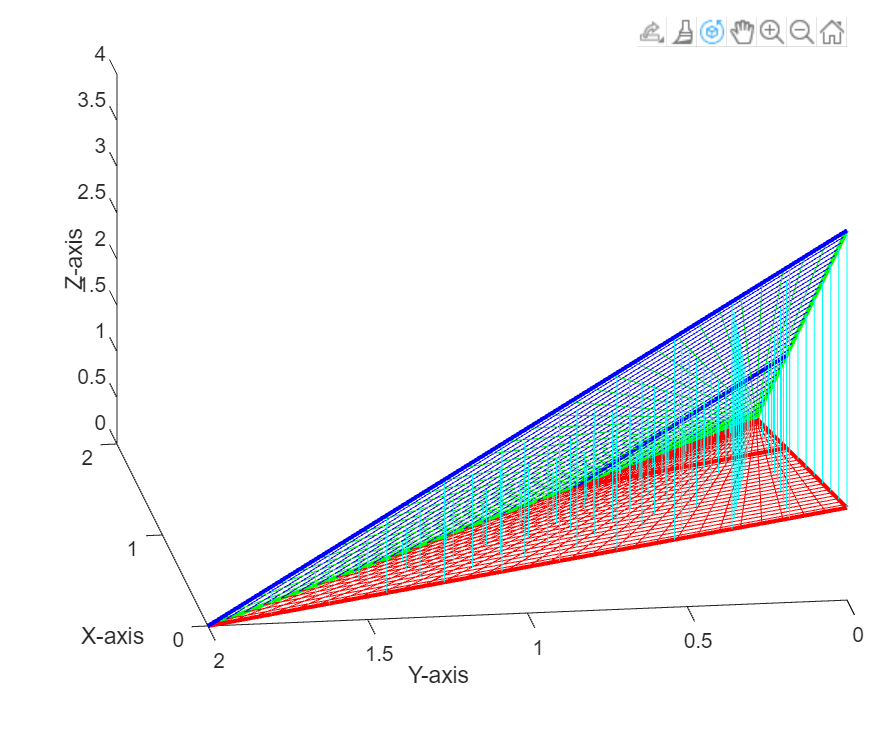
zlabel("Z-axis");

**OUTPUT:**

The volume bounded by x + y + 2z = 2, 2x + 2y + z = 2 and first octane is =   
2







**Question 2:**

**Find the volume of the region cut from the solid elliptical cylinder x2 + 4y2 ≤ 4 by the xy − plane and the plane z = x + 2.**

**CODES:**

close all;

clear;

clc;

% to find triple integral over a region

syms x y z;

%specifying the limits of integrations

lower\_x = -2;

upper\_x = 2;

lower\_y = - (sqrt(4 - x^2)/2);

upper\_y = sqrt(4 - x^2)/2;

lower\_z = 0 + 0\*x ;

upper\_z = x + 2;

%calculating the volume enclosed by triple integration

volume = int(int(int(1 + 0\*z, z, lower\_z, upper\_z), y, lower\_y, upper\_y), x, lower\_x, upper\_x);

%displaying the volume

disp("The volume bounded by x^2 + 4y^2 <= 4, z = 0 and z = x + 2 is = ");

disp(volume);

%displaying the 3D-Plot of the planes

figure(1)

viewSolidone(z, lower\_z, upper\_z, y, lower\_y, upper\_y, x, lower\_x, upper\_x);

xlabel("X-axis");

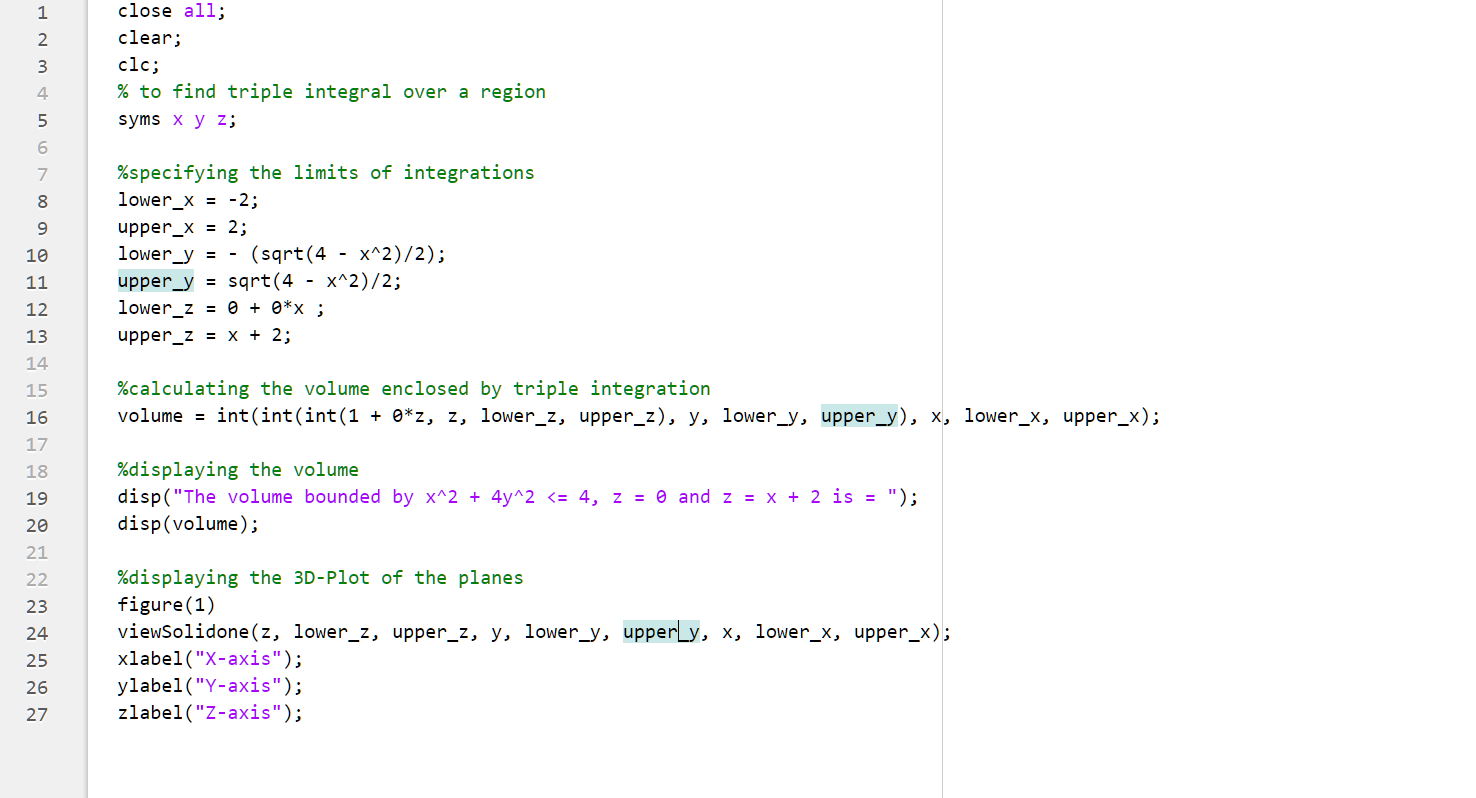
ylabel("Y-axis");

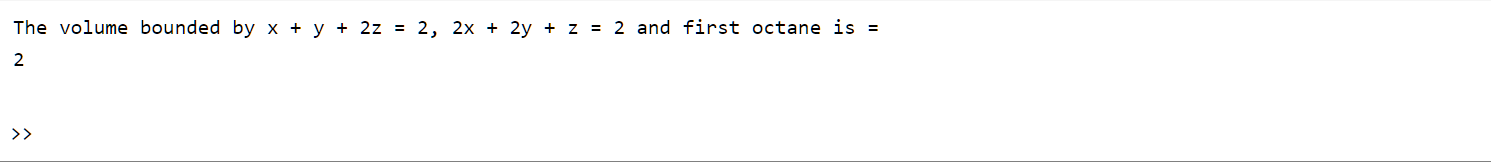
zlabel("Z-axis");

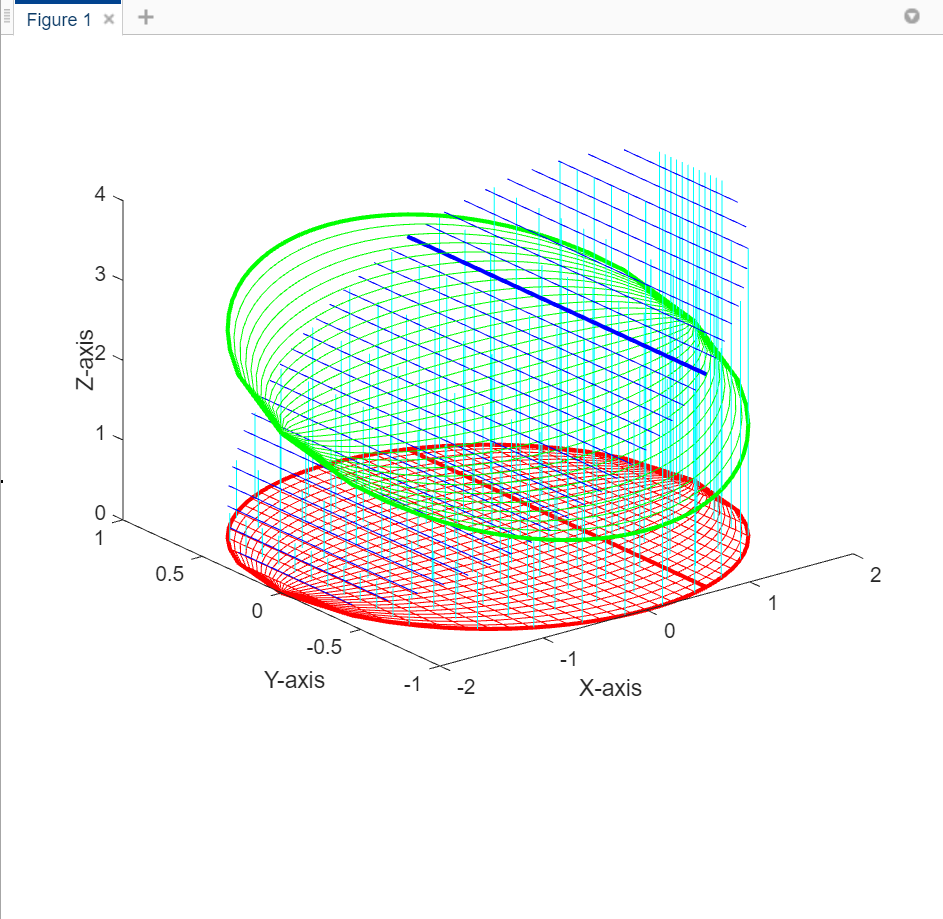
**OUTPUT:**

The volume bounded by x + y + 2z = 2, 2x + 2y + z = 2 and first octane is =   
2

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**Question 3:**

**Calculate the finite region bounded by the planes z = x , x + z = 8, z = y , y = 8 and z = 0.**

**CODES:**

close all;

clear;

clc;

% to find triple integral over a region

syms x y z;

%specifying the limits of the integrals

lowerx = z; upperx = 8 - z;

lowery = z ; uppery = 8 + 0\*z;

lowerz = 0 ; upperz = 4;

%calculating and displaying the volume enclosed

volume = int(int(int(1 + 0\*x, x, lowerx, upperx), y, lowery, uppery), z, lowerz, upperz);

disp("The volume bounded by z = x , x + z = 8, z = y , y = 8 and z = 0 is = ");

disp(volume);

%visualizing the 3D plot of the planes

figure(1)

viewSolidone(x, lowerx, upperx, y, lowery, uppery, z,lowerz, upperz);

xlabel("X-axis");

ylabel("Y-axis");

zlabel("Z-axis");

**OUTPUT:**

The volume bounded by z = x , x + z = 8, z = y , y = 8 and z = 0 is =   
320/3

