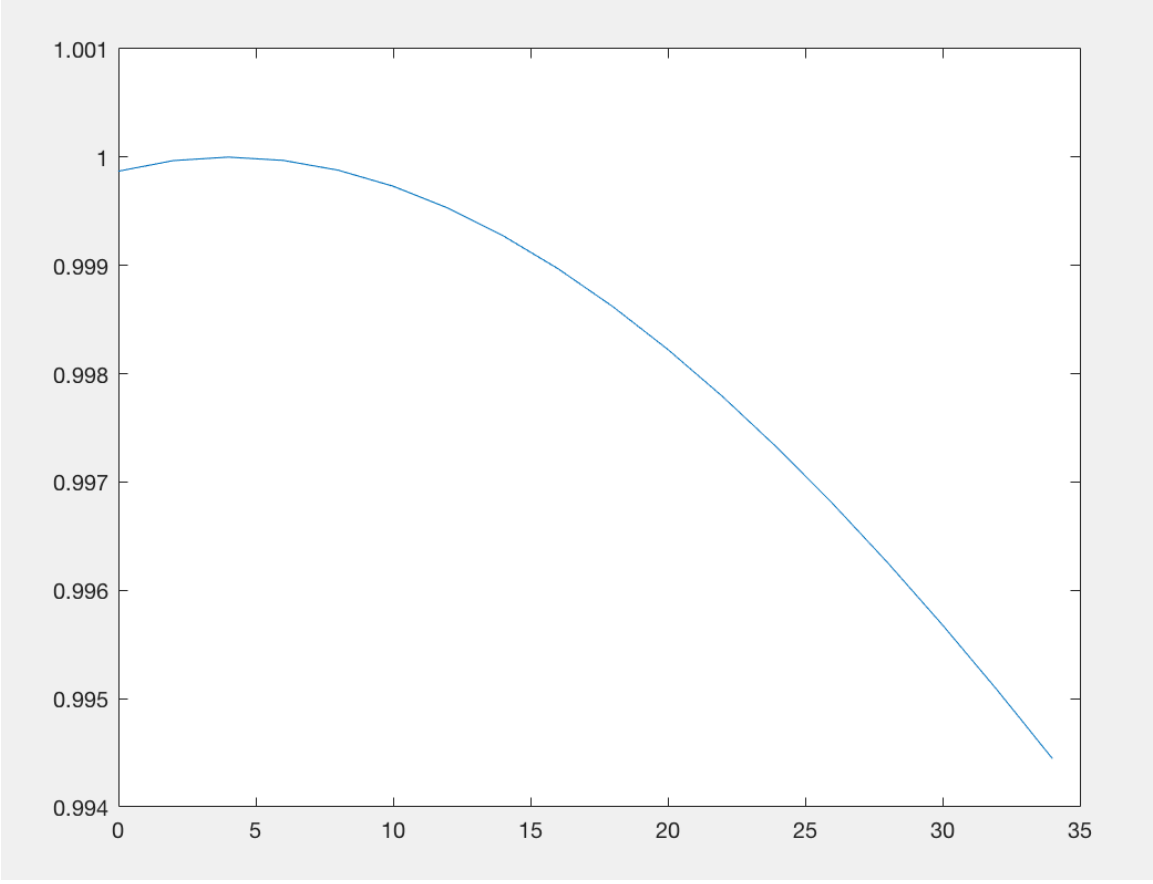
Natalie Weiss
Math 320
Homework 1

Problem 1

```
%make vector of temperatures
tempF = 32:3.6:93.2

%convert vector of temperatures into Celsius
tempC = (tempF-32)*(5/9)

%find density for each temperature and plot
density = 5.5289*10.^-8*tempC.^3 - 8.5016 * 10^-6*tempC.^2 + 6.5622 *
10.^-5*tempC + 0.99987
plot(tempC, density)
```

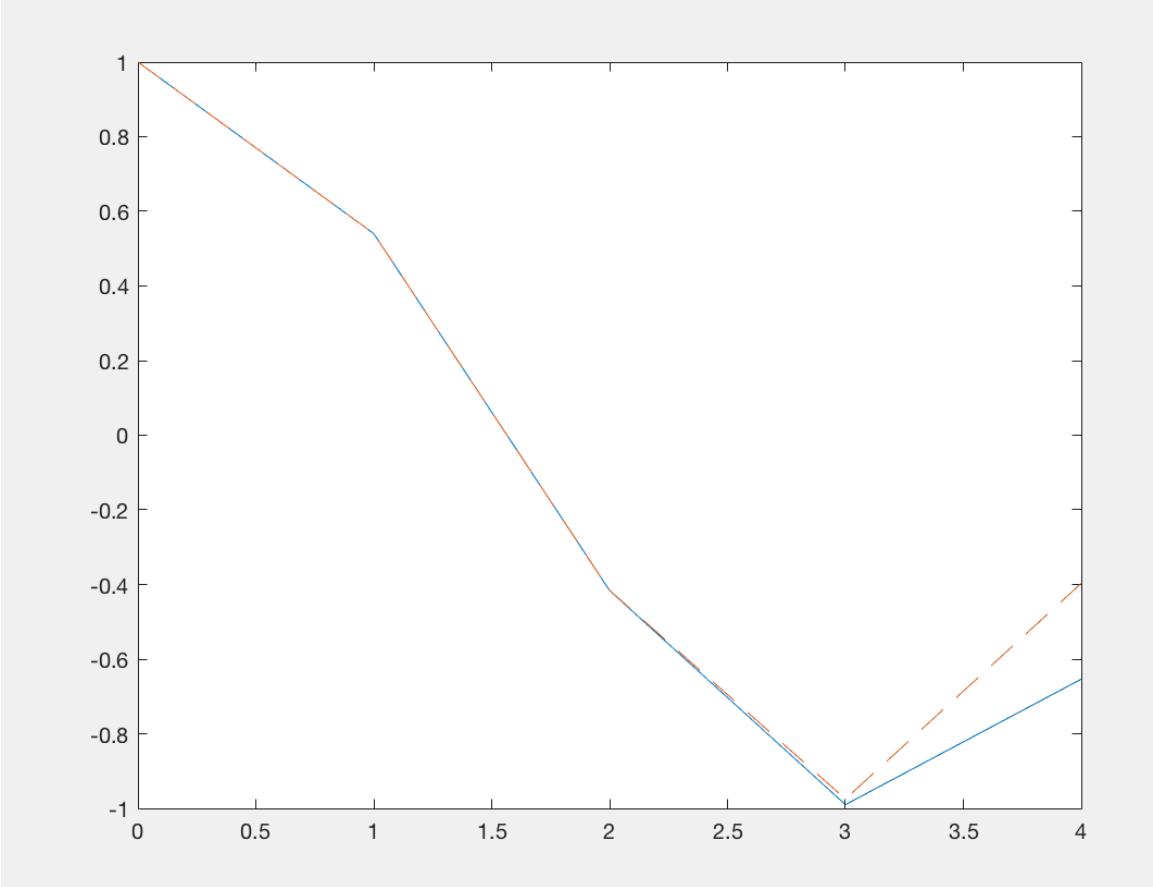


Problem 2

```
%vector within given range
x=0:pi*3/2

%series expansion
series=1-x.^2/factorial(2)+x.^4/factorial(4)-
x.^6/factorial(6)+x.^8/factorial(8)
```

```
%plot cos and series
plot(x,cos(x),x,series,'--')
```



Problem 3

```
%function for generating theta and radius (polar coordinates) based on
initial conditions and
%(x,y) coordinates

function [theta, r] = pr3(x,y)

%conditions for theta
if x==0,
    if y==0,
        theta = 0
    elseif y>0
        theta = pi/2
    elseif y<0
        theta = -pi/2;
    end

elseif x>0,
        theta = atan(y/x)
```

```
elseif x<0,
    if y==0,
        theta = pi
        elseif y>0
            theta = atan(y/x)+pi,
        elseif y<0
            theta = atan(y/x)-pi;


    end
end

%finding radius
r = sqrt (x.^2+y.^2);


end
```

TABLE INPUTS AND OUTPUTS

>> [theta, r] = pr3(2,0)

theta =

0

theta =

0

r =

2

>> [theta, r] = pr3(2,1)

theta =

0.4636

theta =

0.4636

r =

```
   2.2361

>> [theta, r] = pr3(0,3)

theta =

   1.5708


theta =

   1.5708


r =

    3

>> [theta, r] = pr3(-3,1)

theta =

   2.8198


theta =

   2.8198


r =

   3.1623

>> [theta, r] = pr3(-2,0)

theta =

   3.1416


theta =

   3.1416
```

```
r =

    2

>> [theta, r] = pr3(-1,-2)

theta =

  -2.0344


r =

   2.2361

>> [theta, r] = pr3(0,0)

theta =

    0


theta =

    0


r =

    0

>> [theta, r] = pr3(0,-2)

theta =

  -1.5708


r =

    2

>> [theta, r] = pr3(2,2)

theta =
```

0.7854

theta =

0.7854

r =

2.8284

Problem 4

```
%function returning theta, c, magnitude of c based on vectors a and b

function [theta, c, c_mag] = p4(a, b)

%vector c
%a cross b = c
c = cross(a,b);

%magnitudes of each vector
c_mag = sqrt(sum(c.^2));
a_mag = sqrt(sum(a.^2));
b_mag = sqrt(sum(b.^2));

%a dot b = magnitude a * magnitude b * cos theta
%manipulate above equation to isolate theta
theta = acos(dot(a,b)/(a_mag * b_mag));

%plot a, b, and c starting at the origin
plot3([0, a(1)], [0, a(2)], [0, a(3)], 'b--');
hold on
plot3([0, b(1)], [0, b(2)], [0, b(3)], 'r--');
plot3([0, c(1)], [0, c(2)], [0, c(3)], 'g-');

end
```

Inputs and outputs

a. >> [theta, c, c_mag] = p4([6 4 2], [2 6 4])

theta =

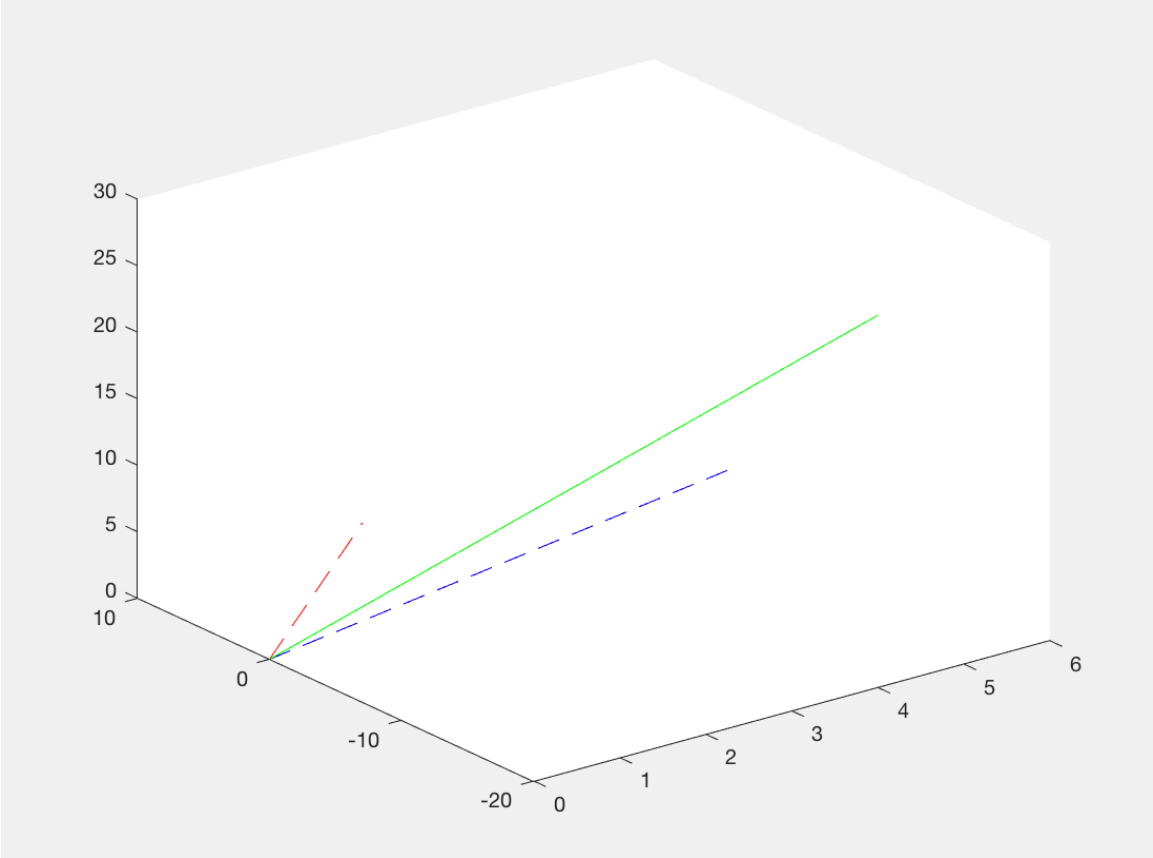
0.6669

c =

4 -20 28

c_mag =

34.6410



b. >> [theta, c, c_mag] = p4([3 2 -6], [4 3 -1])

theta =

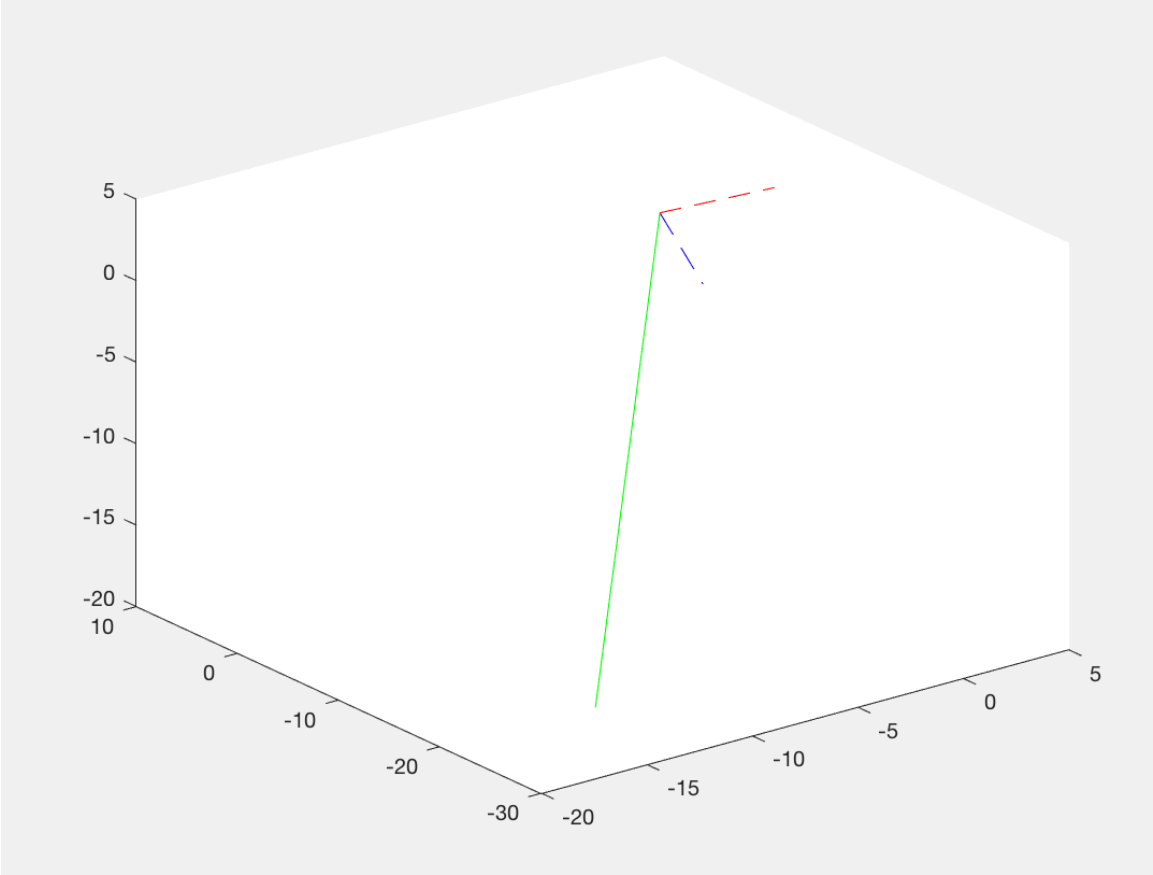
0.8334

c =

16 -21 1

c_mag =

26.4197



c. >> [theta, c, c_mag] = p4([2 -2 1], [4 2 -4])

theta =

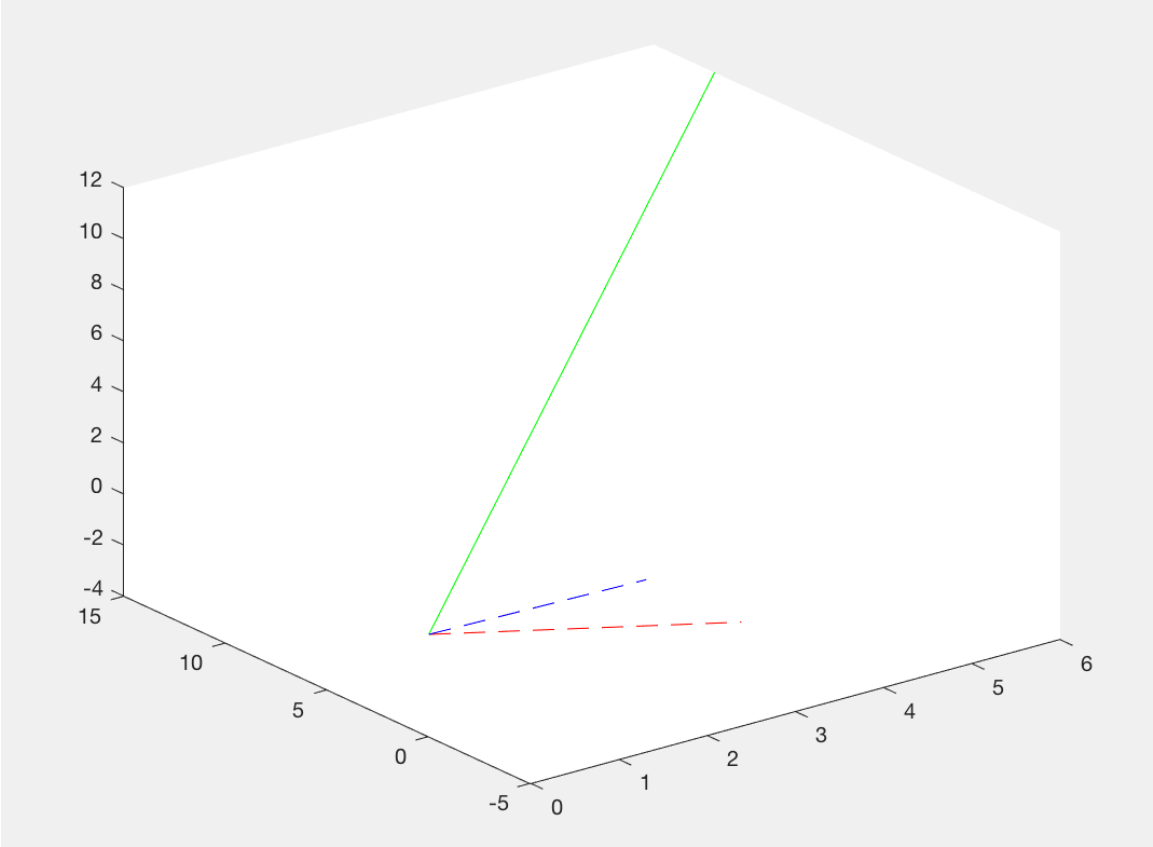
1.5708

c =

6 12 12

c_mag =

18



d. [theta, c, c_mag] = p4([-1 0 0], [0 -1 0])

theta =

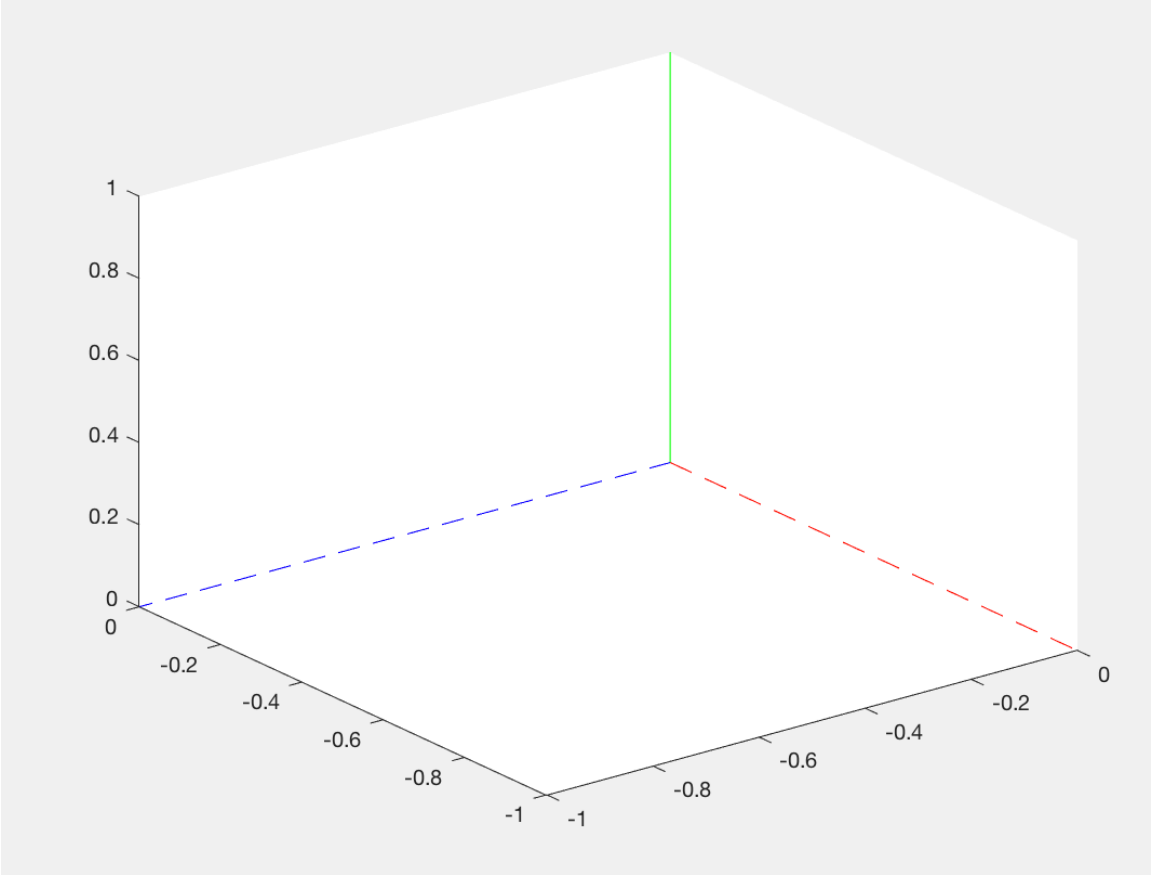
1.5708

c =

0 0 1

c_mag =

1


1
0.8
0.6
0.4
0.2
0
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0