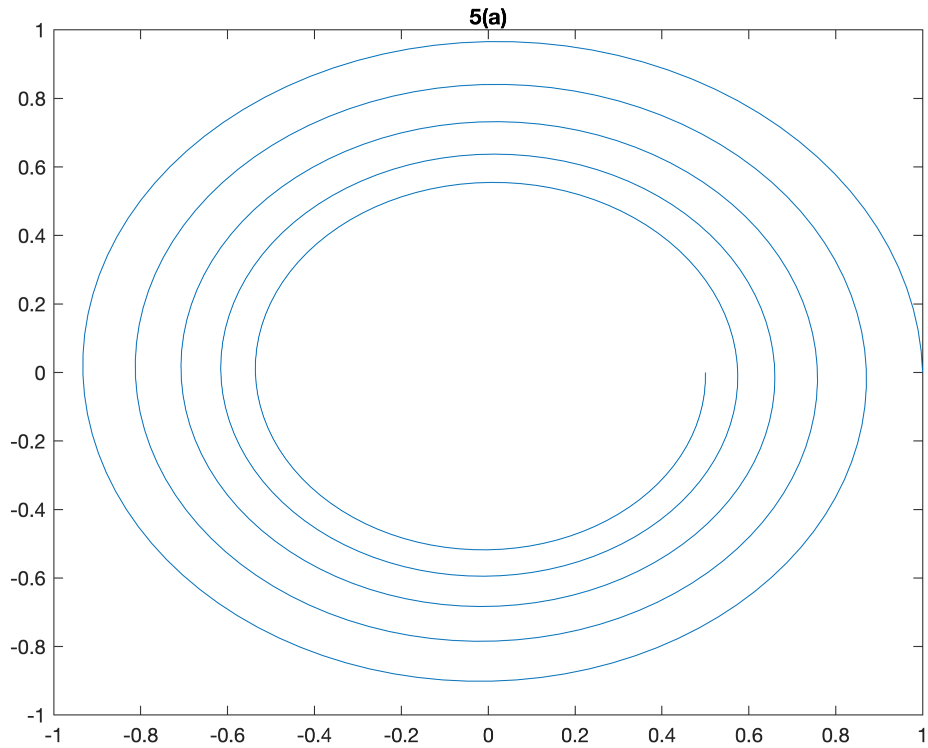
5(a) Task 1:

Code for plotting:

```
t = linspace(0,10,500);
y = exp(t*log(0.5)/(10)).*exp(j*pi*t);
plot(y);
title('5(a)');
```



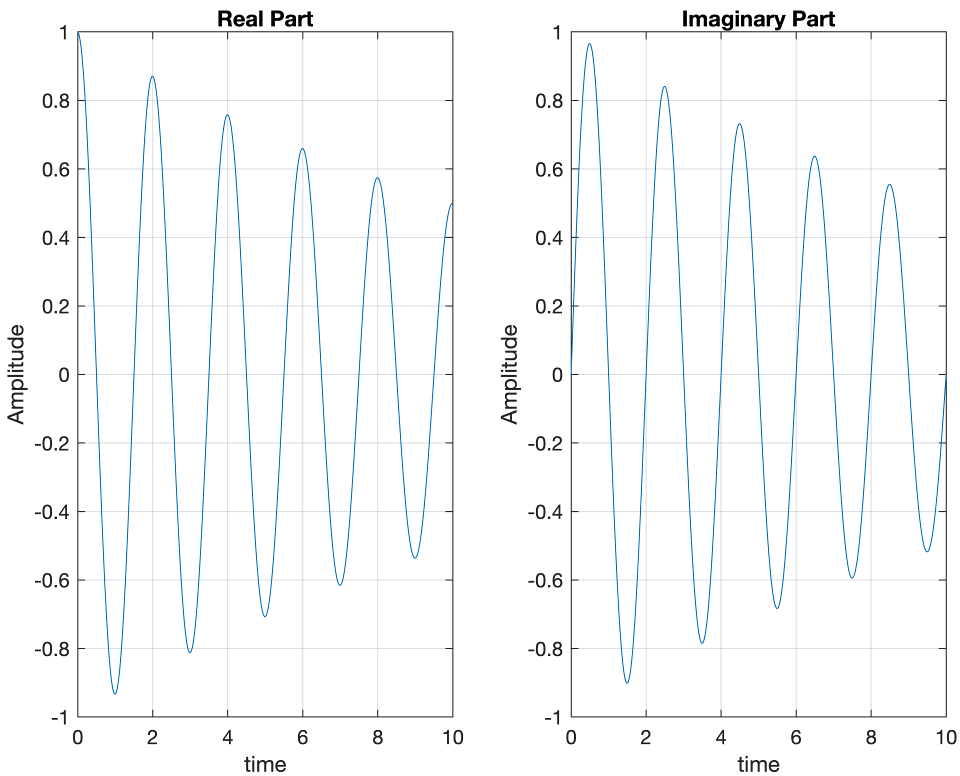
In order for the period to be two seconds, we would want the frequency to be 1/2. Since the angular frequency is essentially 2*pi*f, omega comes out to be pi. As shown in the expression, e^(sigma*t) would contribute towards the decaying of the sinusoid, so in order for the sinusoid to decay till 0.5 of original magnitude over ten seconds, e^(sigma*10) would have to yield 0.5. To do so, we first take the natural log of both sides (sigma*10 = ln(0.5)), then divide by ten, which yields: sigma = ln(0.5)/10.

Plotting this expression directly would yield a circular spiral because MatLab would be showing the plot in imaginary vs real plane instead of plotting the real and complex sinuisoid versus time, and the spiral characteristic is due to the decaying of the signal.

5(b) Task 2:

Code for plotting:

```
t = linspace(0,10,500);
y = exp(-t*log(0.5)/(-10)).*exp(j*pi*t);
y1 = real(y);
y2 = imag(y);
subplot(1,2,1);
plot(t, y1); grid on;
title('Real Part'); xlabel('time');ylabel('Amplitude');
subplot(1,2,2);
plot(t, y2); grid on;
title('Imaginary Part'); xlabel('time');ylabel('Amplitude');
```



5(c) Task 3:

Code for plotting:

```
t = linspace(0,10,500);
y = exp(-t*log(0.5)/(-10)).*exp(j*pi*t);
y1 = abs(y);
y2 = angle(y)/2/pi;
plot(t,y1,'r',t,y2,'b');grid on;
title('5(c)'); xlabel('time'); ylabel('magnitude, angle (in cycles)');
```