Problem 5)

a) Use Mathematica (or equivalent) to make a parametric plot of Eq.9.67.
The x is the real part, and the y is the imaginary part.
To keep it simple, plot this for $\Omega z = \Omega \ \mathrm{Cos}[\theta]$ where θ is the colatitude,
and set $\Omega = 2\pi$, set $\omega_0 = 16\,\Omega$, and plot for t=[0,1/4].
Out[43]= Do this for colatitudes of $\{0,\ \pi/4,\ \pi/2,\ 3\pi/4,\ \pi\}$. Explain where on the earth each colatitude is, and comment on the result of the plot.

b) Repeat the above for the colatitude for Dallas. How long will it take for the pendulum to make a complete revolution. [Use real numbers for this part.]

In[27]:=
```
Clear["Global`*"]
```

```
f[t_] = Exp[-3 I t] Cos[4 t]
```

Out[29]= $e^{-12\,i\,t}\ \mathrm{Cos}[10\ t]$

In[30]:=
```
f[1.23]
```

Out[30]=
```
-0.562766 - 0.783584 i
```

In[31]:=
```
f[1.23] // Re
```

Out[31]=
```
-0.562766
```

In[32]:=
```
f[1.23] // Im
```

Out[32]=
```
-0.783584
```

In[33]:=
```
? ParametricPlot
```

Out[33]=

Symbol

ParametricPlot [{f_x, f_y}, {u, u_{min}, u_{max}}] generates a parametric plot of a curve with x and y coordinates f_x and f_y as a function of u.

ParametricPlot [{{f_x, f_y}, {g_x, g_y}, …}, {u, u_{min}, u_{max}}] plots several parametric curves.

ParametricPlot [{f_x, f_y}, {u, u_{min}, u_{max}}, {v, v_{min}, v_{max}}] plots a parametric region.

ParametricPlot [{{f_x, f_y}, {g_x, g_y}, …}, {u, u_{min}, u_{max}}, {v, v_{min}, v_{max}}] plots several parametric regions.

ParametricPlot [{…, w[{f_x, f_y}], …}, …] plots the curve {f_x, f_y} with features defined by the symbolic wrapper w.

ParametricPlot […, {u, v} ∈ reg] takes parameters {u, v} to be in the geometric region reg.

In[42]:=
```
ParametricPlot[{f[t] // Re, f[t] // Im}, {t, 0, 2}]
```

Out[42]=