MATH G5110: Lab 1d

Task 1:

P = (1/√26) (4,1,3)
Q = (1/(3√26)) (-8,11,7)
W = (1/3) (-1,-2,2)

Task 2:

[Id]_{EU} = (P Q W) =

```
    0.7845   -0.5230   -0.3333
    0.1961    0.7191   -0.6667
    0.5883    0.4576    0.6667
```

[id]_{UE} = ([Id]_{EU})^(-1) = ([Id]_{EU})^T =

```
    0.7845    0.1961    0.5883
   -0.5230    0.7191    0.4576
   -0.3333   -0.6667    0.6667
```

Task 3:

[R_3]_{EE} = [Id]_{EU} * [R_3]_{UU} * [id]_{UE}

(a) t=0.5: theta = omega * t = 3.91*(0.5) = 1.955 rad

[R_3]_{UU} =

```
   -0.3748   -0.9271         0
    0.9271   -0.3748         0
         0         0    1.0000
```

[R_3]_{EE} =

```
   -0.2221   -0.3125   -0.9236
    0.9236    0.2362   -0.3020
    0.3125   -0.9201    0.2362
```

x(t=0.5) = [R_3]_{EE} * x(0) =

```
-467.3315
 355.8971
 122.2313
```

(b) t=1.0: theta = omega * t = 3.91*(1) = 3.91 rad

[R_3]_{UU} =

```
   -0.7190    0.6950         0
   -0.6950   -0.7190         0
         0         0    1.0000
```

[R_3]_{EE} =

```
   -0.5280    0.8453    0.0813
   -0.0813    0.0450   -0.9957
   -0.8453   -0.5323    0.0450
```

x(t=1.0) = [R_3]_{EE} * x(0) =

```
-120.3487
-384.4654
-444.6397
```

(c) t=1.5: theta = omega * t = 3.91*(1.5) = 5.865 rad

[R_3]_{UU} =

```
    0.9138    0.4061         0
   -0.4061    0.9138         0
         0         0    1.0000
```

[R_3]_{EE} =

$$\begin{bmatrix} 0.9234 & 0.2899 & 0.2516 \\ -0.2516 & 0.9521 & -0.1737 \\ -0.2899 & 0.0971 & 0.9521 \end{bmatrix}$$

x(t=1.5) = [R_3]_{EE} * x(0) =

$$\begin{bmatrix} 557.5499 \\ -67.6857 \\ 211.0893 \end{bmatrix}$$