Problem 3;

```
clear;clc;close all;

Vxo = -0.18;
Vyo = -0.07;
Vzo = -0.08;
dt_1 = 5*60;
dt_2 = 60*60;

options = odeset('RelTol',1e-5);
[~,Z] = ode45('RelMotion',[0 dt_1],[0 0 0 Vxo Vyo Vzo],options);
fprintf('Cygnus distance from the STS after 5 min %.1f m
 \n',norm(Z(end,(1:3))))
[~,Z] = ode45('RelMotion',[0 dt_2],[0 0 0 Vxo Vyo Vzo],options);
fprintf('Cygnus distance from the STS after 60 min %.1f m
 \n',norm(Z(end,(1:3))))
```

Cygnus distance from the STS after 5 min 64.3 m
Cygnus distance from the STS after 60 min 1522.4 m

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```
function [vecDeriv] = RelMotion(t,z)

mu = 3.9860044189e5;
r = 650+6378;
n = sqrt(mu/r^3);

vecDeriv(1) = z(4);
vecDeriv(2) = z(5);
vecDeriv(3) = z(6);
vecDeriv(4) = 3*n^2*z(1)+2*n*z(5);
vecDeriv(5) = -2*n*z(4);
vecDeriv(6) = -n^2*z(3);
vecDeriv = vecDeriv.';
end
```