```
%problem 4
mu = 398600;
r = 402000;
v = 2.23;
tr = 150*pi/180; %converting to radians


%semi major
a = mu/(v^2 - (2*mu/r));

%solveing for eccentricity
p = [a r*cos(tr) -r-a];
ec=roots(p);

fprintf('\n eccentricity values %g  \n',ec);

%choose e accordingly , here its a value greater than 1 for hyperbola

%closest approach and velocity at the same
r_cl = a*(ec-1);
v_cl = sqrt(mu*((2/r_cl)+(1/a)));

fprintf('\n distance of closest approach and corresponding velocity are %g km %g km/s\n',r_cl(1),v_cl(1));
%use 1 or 2 accordingly

%v_excess
v_x = sqrt(mu/a);
fprintf('\n excess velocity is %g km/s\n',v_x);
```

```
 eccentricity values 3.69734

 eccentricity values -1.086

 distance of closest approach and corresponding velocity are 359608 km 2.28181 km/s

 excess velocity is 1.72911 km/s
```

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