ORBITAL MECHANICS - MIDTERM
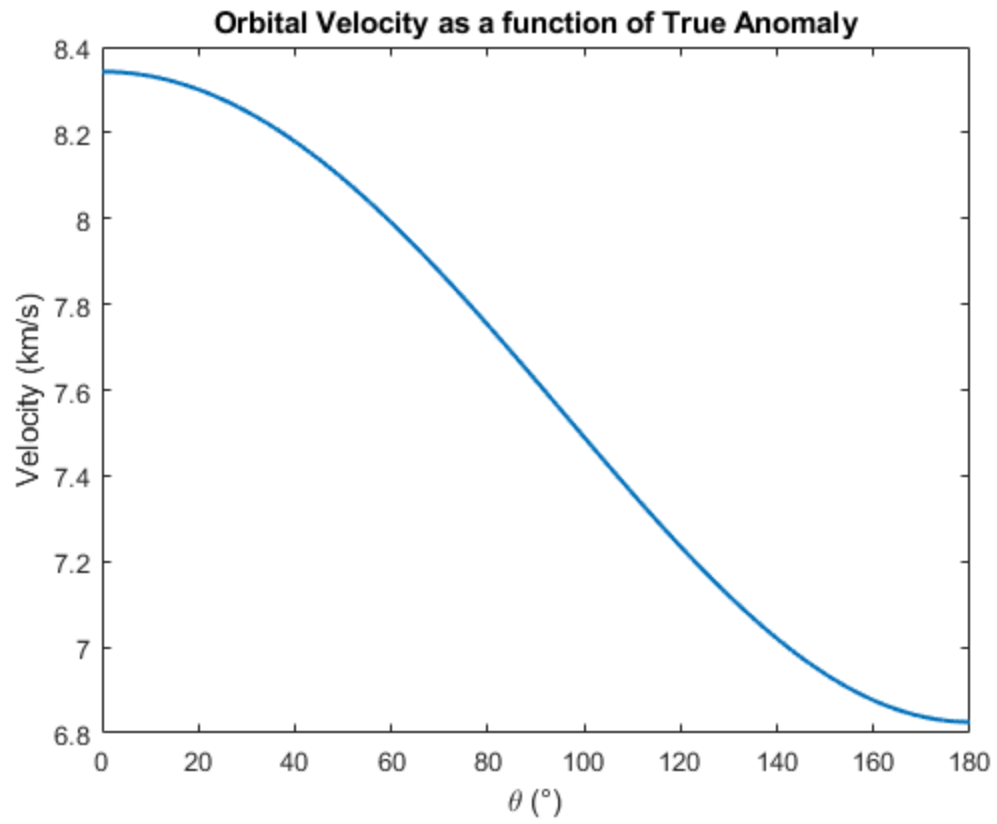
Ex. 9

```matlab
clear all
close all
a=7000;              %semi major axis [km]
e=0.1;               %eccentricity
theta=[0:0.1:180];   %true anomaly range [degrees]
f=theta*pi/180;      %true anomaly in radians
mu=398600;           %gravitational parameter [km^3/s^2]

h=sqrt(a*mu*(1-e^2));

for i=1:length(theta)
    %position as a function of true anomaly
    r(i)=(h^2/mu)/(1+e*cos(f(i)));
    %velocity as a function of true anomaly (given energy equation)
    v(i)=sqrt(mu*((2/r(i))-(1/a)));
end

plot(theta,v,'LineWidth',1.5)
title('Orbital Velocity as a function of True Anomaly')
xlabel('\theta (°)')
ylabel('Velocity (km/s)')
```

Orbital Velocity as a function of True Anomaly

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