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% this program computes the trajectory of a falling object using Newton's
% gravity model

G = 6.7e-11;          % gravitational constant
mEarth = 5.97e24;     % mass of earth in kg.
rEarth = 6.37e6;      % radius of earth in m.

n = 5;          % number of subintervals
dt = 2;         % length of subinterval

p(1) = 500;     % initial position
v(1) = 0;       % initial velocity
t(1) = 0;       % start time

for i=1:n
   t(i+1) = t(i) + dt;        % calc. time at start of i+1 subinterval
   p(i+1) = p(i) + v(i)*dt;   % calc. position at start of i+1 subinterval
   ati = -G*mEarth / (p(i) + rEarth)^2; % calc. accel at start of i subinterval
   v(i+1) = v(i) + ati*dt;    % calc. velocity at start of i+1 subinterval
end

plot(t, p)       % plot the trajectory
xlabel('time')
ylabel('position')
axis([0 10 0 500])
```