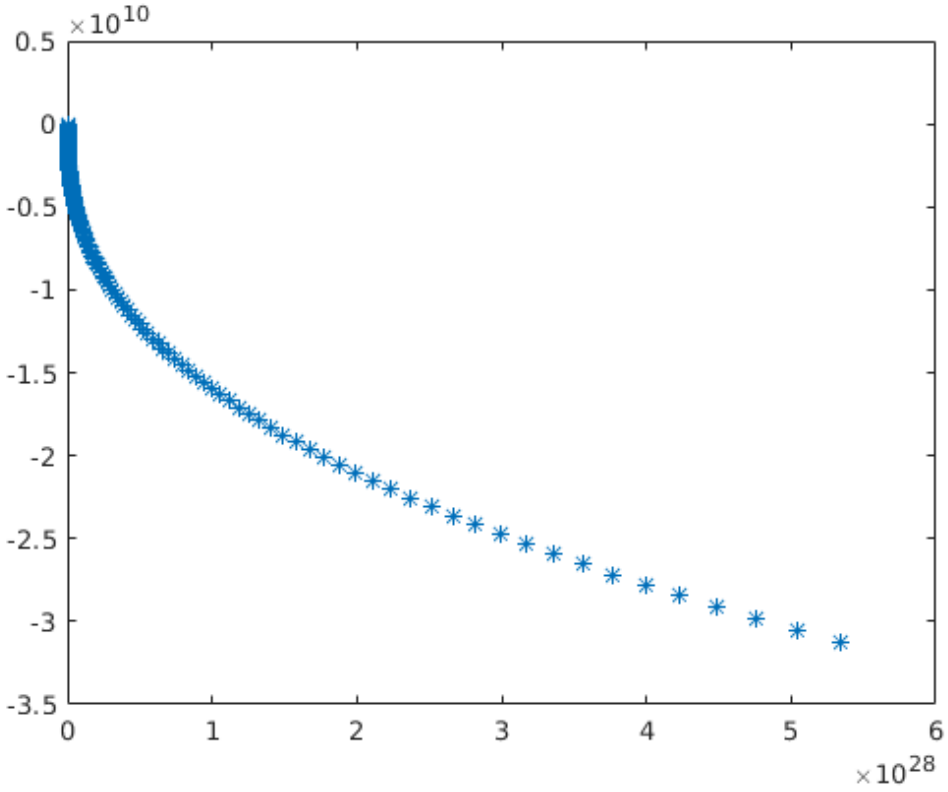
Problem 4 - Tank

```
type tank_func

% establish constants for problem
Dt = 3; % diameters of tank and at opening
Do = 0.03;
A = pi*Do^2; % area of opening
R = Dt / 2; % radius of tank
h = 2.75; % initial height
t = 0;
C = 0.55; % discharge coefficient
param = [C, A, R]; % parameters for solver

% constants for numerical solution
tau = 0.0001;
tol = 1e-9;

% integrate equation with adaptive runge kutta
i = 1;
while h > 0
    hp(i) = h; % save h and t for plotting
    tp(i) = t;
    % calculate next vector
    [h, t, tau] = rka(h, t, tau, tol, 'tank_func', param);
    i = i + 1;
    % break if negative
end

% plot solution
plot(tp, hp, '*')

tf = tp(end)


function [hn] = tank_func(h, t, param)
% [sn] = tank_func(s, t, param)
% rhs of diff eq for problem 4
% h: current height
% t: current time
% param: vector [C, A, R]

% assign parameters from vector
C = param(1);
A = param(2);
R = param(3);
g = 9.81;
% caculate derivatives
Q = C*A*sqrt(2*g*h); % flow rate
Vh = 2*pi*R*h - pi*h^2; % dV/dt

% return height
```

```
hn = -Q / Vh;
end
Warning: Imaginary parts of complex X and/or Y arguments ignored

tf =

   5.3389e+28
```



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