```matlab
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% MATH 4540
% Assignment 3

format long

% 6.2 2c) Plot the approximate solutions for the IVP y'= 2(t + 1)y from 0
% to 1 for step sizes h = 0.1, 0.05, 0.025, and the true solution

f = @(t, w) 2 * (t + 1) * w;

syms y(t)
ySol(t) = dsolve(diff(y,t) == 2 * (t + 1) * y, y(0) == 1);

plot([0.1, 0.05, 0.025, 0], [euler(f, 0, 1, 0.1, 1), euler(f, 0, 1, 0.05, 1), euler(f,
0, 1, 0.025, 1), double(ySol(1))])

function [result] = euler(f, a, b, h, y0)
    n = (b - a) / h;
    t = zeros(1, n+1);
    w = zeros(1, n+1);
    t(1) = a;
    w(1) = y0;
    result = 0;
    for i=1:n
        t(i+1) = t(i) + h;
        result = w(i) + (h / 2) * (f(t(i),w(i)) + f(t(i)+h,w(i)+h*f(t(i),w(i))));
        w(i+1) = result;
    end
end
```

Results