Matlab Code

```
% Hunter Phillips
% Problem 8 - (b) and (c)
% MAE 488
% 02/11/19

clc

%% Header
d_bullets = repmat('*', 50, 1); % concise way to make a lot of chars
fprintf('%c',d_bullets)
fprintf('\nMAE 488, Homework #3, Spring 2019, Hunter Phillips\n')
fprintf('%c',d_bullets)
fprintf('\n\n')

%% Problem 8 (b)



clear
clf

f1 = figure(1);

su_bullets = repmat('*', 25, 1); % setting up cmd line output
un_bullets = repmat('-', 25, 1);
fprintf('%c',su_bullets)
fprintf('\nProblem 8 - Part b\n')
fprintf('%c',su_bullets)
fprintf('\n\n')

num   = [0 0 3];
denom = [4 28 24];
transfer_function = tf(num, denom)
t = 0:0.1:5;
x_t = (1/8) + (1/40)*(exp(-6*t))-(3/20)*(exp(-t));
[x_t_2, t2] = step(transfer_function,t);

% For Table Output
t_hand_calculated = t';
x_t_hand_calculated = x_t';
t_matlab_calculated = t2;
x_t_matlab_calculated = x_t_2;
Table_of_Values = table(t_hand_calculated,x_t_hand_calculated,
t_matlab_calculated,x_t_matlab_calculated )



%% Problem 8 (c)
subplot(2,1,1)
plot(t2,x_t_2,'r-')
title({'MAE 488, Homework 3, Problem 8, Part c'})
legend('Matlab Calculated', 'location', 'southeast')
xlabel('Time (s)')
ylabel('Function x(t)')
```

```
subplot(2,1,2)
plot(t,x_t,'b-')
legend('Hand Calculated', 'location', 'southeast')
xlabel('Time (s)')
ylabel('Function x(t)')

%% print

% print(f1,'problem_8_c.png','-dpng','-r1200');
```

Matlab Output

```
**************************************************
MAE 488, Homework #3, Spring 2019, Hunter Phillips
**************************************************

************************
Problem 8 - Part b
************************


transfer_function =

        3
  ----------------
  4 s^2 + 28 s + 24

Continuous-time transfer function.


Table_of_Values =

  51×4 table

    t_hand_calculated    x_t_hand_calculated    t_matlab_calculated    x_t_matlab_calculated
    _________________    ___________________    ___________________    _____________________

           0                      0                      0                      0
         0.1                 0.0029947                  0.1                 0.0029947
         0.2                 0.0097202                  0.2                 0.0097202
         0.3                   0.01801                  0.3                   0.01801
         0.4                   0.02672                  0.4                   0.02672
         0.5                  0.035265                  0.5                  0.035265
         0.6                  0.043361                  0.6                  0.043361
         0.7                  0.050887                  0.7                  0.050887
         0.8                  0.057806                  0.8                  0.057806
         0.9                  0.064127                  0.9                  0.064127
           1                   0.06988                    1                   0.06988
         1.1                  0.075103                  1.1                  0.075103
         1.2                   0.07984                  1.2                   0.07984
         1.3                   0.08413                  1.3                   0.08413
         1.4                  0.088016                  1.4                  0.088016
         1.5                  0.091534                  1.5                  0.091534
         1.6                  0.094717                  1.6                  0.094717
         1.7                  0.097598                  1.7                  0.097598
         1.8                   0.10021                  1.8                   0.10021
         1.9                   0.10256                  1.9                   0.10256
           2                    0.1047                    2                    0.1047
         2.1                   0.10663                  2.1                   0.10663
         2.2                   0.10838                  2.2                   0.10838
         2.3                   0.10996                  2.3                   0.10996
         2.4                   0.11139                  2.4                   0.11139
         2.5                   0.11269                  2.5                   0.11269
         2.6                   0.11386                  2.6                   0.11386
         2.7                   0.11492                  2.7                   0.11492
```

2.8	0.11588	2.8	0.11588
2.9	0.11675	2.9	0.11675
3	0.11753	3	0.11753
3.1	0.11824	3.1	0.11824
3.2	0.11889	3.2	0.11889
3.3	0.11947	3.3	0.11947
3.4	0.11999	3.4	0.11999
3.5	0.12047	3.5	0.12047
3.6	0.1209	3.6	0.1209
3.7	0.12129	3.7	0.12129
3.8	0.12164	3.8	0.12164
3.9	0.12196	3.9	0.12196
4	0.12225	4	0.12225
4.1	0.12251	4.1	0.12251
4.2	0.12275	4.2	0.12275
4.3	0.12296	4.3	0.12296
4.4	0.12316	4.4	0.12316
4.5	0.12333	4.5	0.12333
4.6	0.12349	4.6	0.12349
4.7	0.12364	4.7	0.12364
4.8	0.12377	4.8	0.12377
4.9	0.12388	4.9	0.12388
5	0.12399	5	0.12399

Matlab Figures

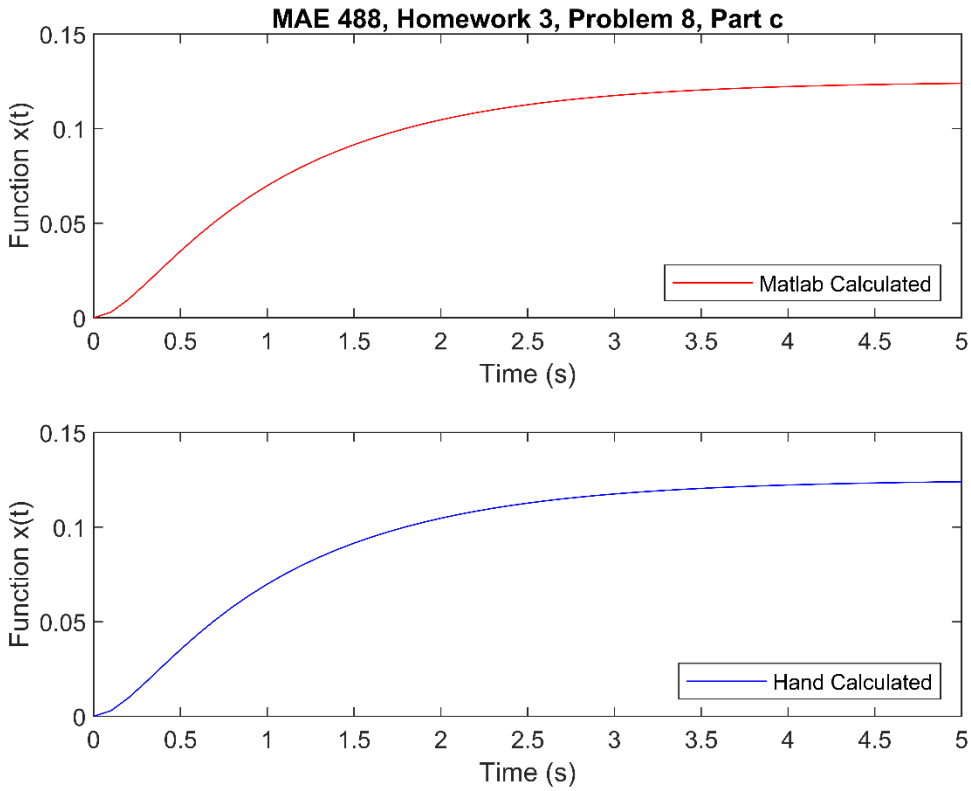

Figure 1: Problem 8, Part c