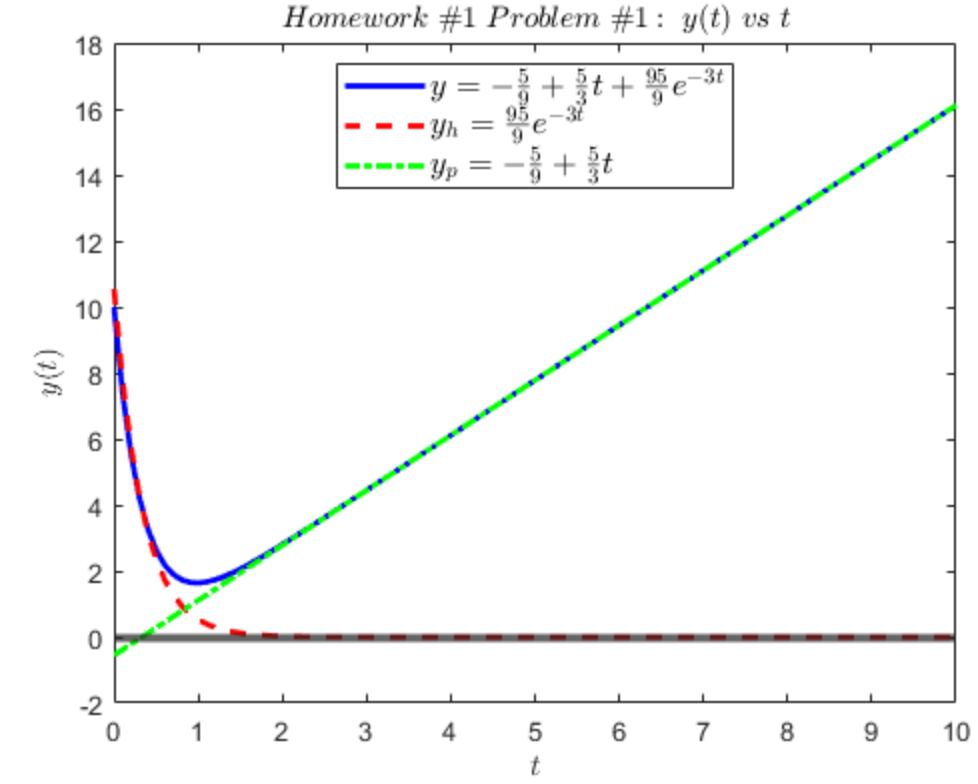
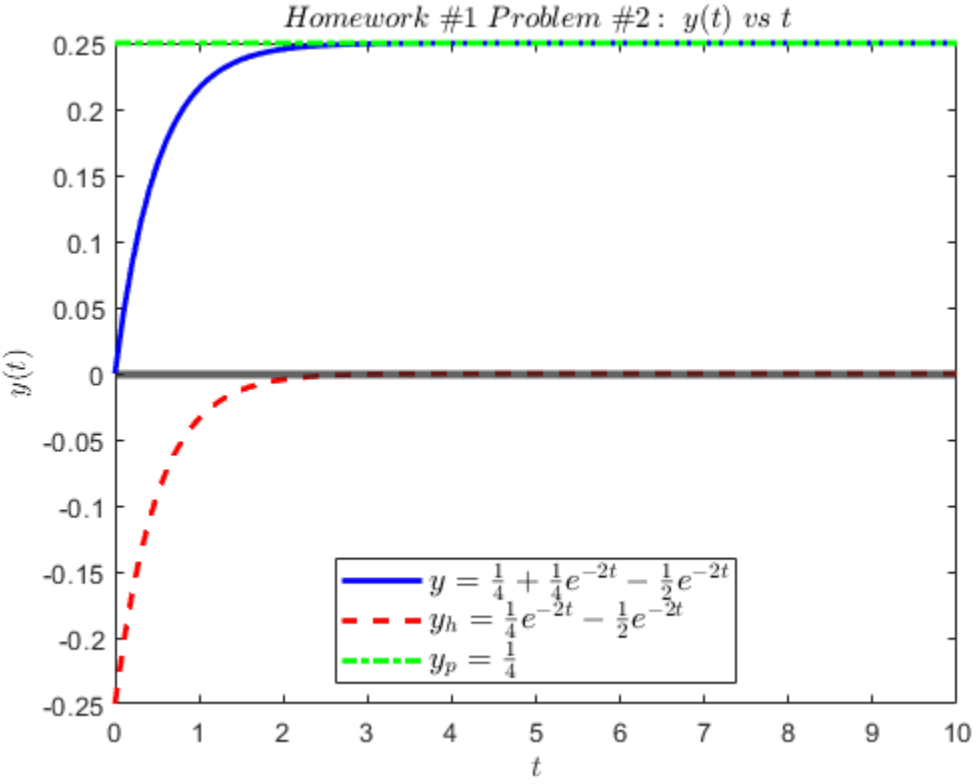
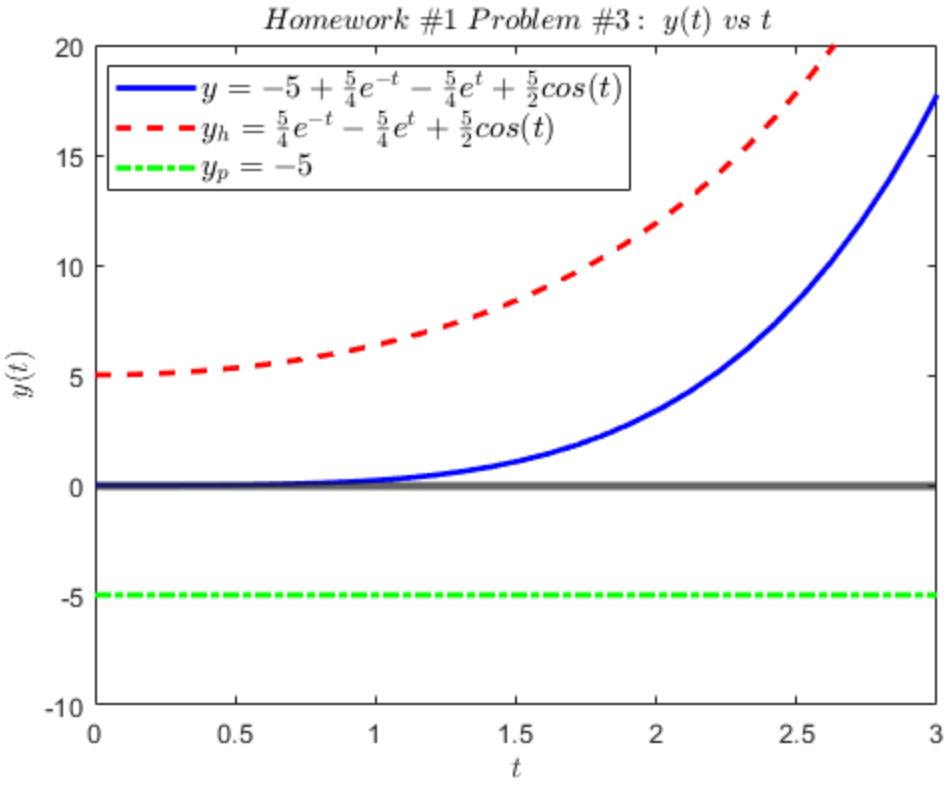
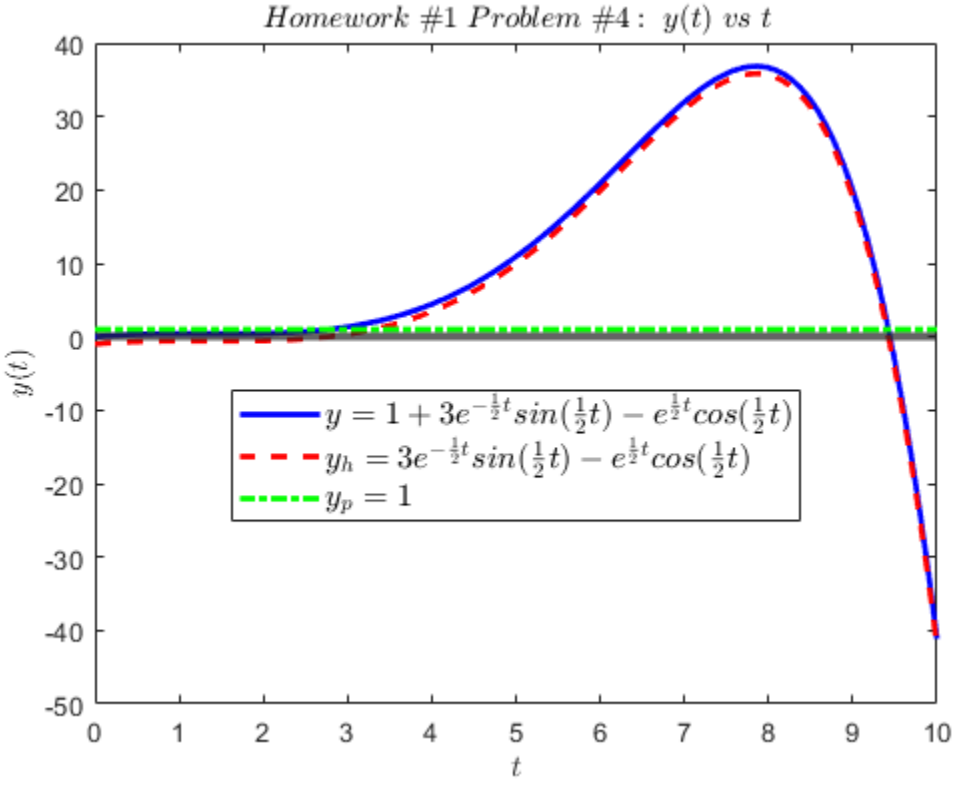
```
clc;
clear;
close all;

res = 100;
t = linspace(0,10,res);

%%Problem 1
y = -5/9 + (5/3)*t + (95/9)*exp(1).^(-3*t);
y_h = (95/9)*exp(1).^(-3*t);
y_p = -5/9 + (5/3)*t;
y_plots = [y;y_h;y_p];
%y_plots(1,:)
names = {'$ y = -\frac{5}{9} + \frac{5}{3}t + \frac{95}{9}e^{-3t} $','$ y_{h}
 = \frac{95}{9}e^{-3t} $','$ y_{p} = -\frac{5}{9} + \frac{5}{3}t $'};
colors = ["b-" , "r--" , "g-."];
titlesAndLabels = ["$ Homework \ \#1 \ Problem \ \# 1: \ y(t) \ vs \ t $","$ t
 $","$ y(t) $"]; %"title", "x label", "y label"
figure;
graphsPlotter2D(t,y_plots,names,colors,titlesAndLabels,NaN)
hold off;

%%Problem 2
y = 1/4 + (1/4)*exp(1).^(-2*t) - (1/2)*exp(1).^(-2*t);
y_h = (1/4)*exp(1).^(-2*t) - (1/2)*exp(1).^(-2*t);
y_p = 1/4 * ones(1,length(t)); %need to have an entire vector of the same
 constant
y_plots = [y;y_h;y_p];
names = {'$ y = \frac{1}{4} + \frac{1}{4}e^{-2t} - \frac{1}{2}e^{-2t} $','$
 y_{h} = \frac{1}{4}e^{-2t} - \frac{1}{2}e^{-2t} $','$ y_{p} = \frac{1}{4}
 $'};
colors = ["b-" , "r--" , "g-."];
titlesAndLabels = ["$ Homework \ \#1 \ Problem \ \# 2: \ y(t) \ vs \ t $","$ t
 $","$ y(t) $"]; %"title", "x label", "y label"
figure;
graphsPlotter2D(t,y_plots,names,colors,titlesAndLabels,NaN)
hold off;

%%Problem 3
y = -5 + (5/4)*exp(1).^(-1*t) + (5/4)*exp(1).^(t) + (5/2).*cos(t);
y_h = (5/4)*exp(1).^(-1*t) + (5/4)*exp(1).^(t) + (5/2).*cosd(t);
y_p = -5 * ones(1,length(t)); %need to have an entire vector of the same
 constant
y_plots = [y;y_h;y_p];
names = {'$ y = -5 + \frac{5}{4}e^{-t} - \frac{5}{4}e^{t} +\frac{5}{2}cos(t)
 $','$ y_{h} = \frac{5}{4}e^{-t} - \frac{5}{4}e^{t} +\frac{5}{2}cos(t) $','$
 y_{p} = -5 $'};
colors = ["b-" , "r--" , "g-."];
titlesAndLabels = ["$ Homework \ \#1 \ Problem \ \# 3: \ y(t) \ vs \ t $","$ t
 $","$ y(t) $"]; %"title", "x label", "y label"
figure;
graphsPlotter2D(t,y_plots,names,colors,titlesAndLabels,[0,3;-10,20])
```

```
hold off;

%%Problem 4
y = 1 + 3*exp(1).^((-1/2)*t).*sin((1/2)*t) + -
 exp(1).^((1/2)*t).*cos((1/2)*t);
y_h = 3*exp(1).^((-1/2)*t).*sin((1/2)*t) + - exp(1).^((1/2)*t).*cos((1/2)*t);
y_p = ones(1,length(t)); %need to have an entire vector of the same constant
y_plots = [y;y_h;y_p];
names = {'$ y = 1 + 3e^{-\frac{1}{2}t}sin(\frac{1}{2}t) - e^{\frac{1}
{2}t}cos(\frac{1}{2}t) $','$ y_{h} = 3e^{-\frac{1}{2}t}sin(\frac{1}{2}t) -
 e^{\frac{1}{2}t}cos(\frac{1}{2}t) $','$ y_{p} = 1 $'};
colors = ["b-" , "r--" , "g-."];
titlesAndLabels = ["$ Homework \ \#1 \ Problem \ \# 4: \ y(t) \ vs \ t $","$ t
 $","$ y(t) $"]; %"title", "x label", "y label"
figure;
graphsPlotter2D(t,y_plots,names,colors,titlesAndLabels,NaN)
hold off;



%%Plotting Function
function plotReturn =
 graphsPlotter2D(x,y_graphs,legendStuff,lineColors,graphTitles,limits)
    %figure;
    for i = 1:height(y_graphs)
        plot(x,y_graphs(i,:),lineColors(i),LineWidth=2)
        hold on;
    end
    lgnd= legend(legendStuff);
    set(lgnd, 'Interpreter','latex')
    lgnd.FontSize = 12;
    lgnd.Location = 'best';
    title(graphTitles(1),'Interpreter','latex')
    xlabel(graphTitles(2),'Interpreter','latex')
    ylabel(graphTitles(3),'Interpreter','latex')
    yline(0,'LineWidth',3,'HandleVisibility','off')
    if isnan(limits) == false
        xlim(limits(1,:));
        ylim(limits(2,:));
    end

    %hold off;
end
```


Homework #1 Problem #1 : y(t) vs t
y = −5/9 + 5/3 t + 95/9 e^−3t
y_h = 95/9 e^−3t
y_p = −5/9 + 5/3 t
y(t)
t


Homework #1 Problem #2 : y(t) vs t
y = 1/4 + 1/4 e^−2t − 1/2 e^−2t
y_h = 1/4 e^−2t − 1/2 e^−2t
y_p = 1/4
y(t)
t


Homework #1 Problem #3 : y(t) vs t
y = −5 + 5/4 e^−t − 5/4 e^t + 5/2 cos(t)
y_h = 5/4 e^−t − 5/4 e^t + 5/2 cos(t)
y_p = −5
y(t)
t
20
15
10
5
0
-5
-10
0
0.5
1
1.5
2
2.5
3


Homework #1 Problem #4 : y(t) vs t
y = 1 + 3e^−1/2 t sin(1/2 t) − e^1/2 t cos(1/2 t)
y_h = 3e^−1/2 t sin(1/2 t) − e^1/2 t cos(1/2 t)
y_p = 1
y(t)
t
40
30
20
10
0
-10
-20
-30
-40
-50
0
1
2
3
4
5
6
7
8
9
10

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