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```
%ENG006 A07
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%SID: 913186040
%These programs solves 4 problems in HW5
```

Problem 1:

```
A = randn(3);
B = randn(3);

% Create two 3X3 matrices called A and B
% and fill them up with random integers
% using the random number generator.

%a)
fprintf('Problem 1.a:\n'); % Print with format
disp(transpose(A + B)); % Use Matlab to compute: ( A + B ) ^ T

%b)
fprintf('Problem 1.b:\n'); % Print with format
disp(transpose(A) + transpose(B)); % Use Matlab to compute: A^T + B^T

if transpose(A + B) == (transpose(A) + transpose(B))
    fprintf('Comparing my result with the result from part (a), the
 results are very consistent with mathematical expectations.\n'); %
 Print with format
else
    fprintf('Comparing my result with the result from part (a), the
 results are not consistent with mathematical expectations.\n'); %
 Print with format
end

%c)
fprintf('Problem 1.c:\n'); % Print with format
disp(A * B); % Use Matlab to matrix multiply the matrix A with matrix
 B
```

```
%d)
fprintf('Problem 1.d:\n'); % Print with format
disp(B * A); % Use Matlab to matrix multiply the matrix A with matrix
 B

fprintf('Comparing my result with the result from part (c), the
 results are very consistent with mathematical expectations\n'); %
 Print with format

%e)
fprintf('Problem 1.e:\n'); % Print with format
disp(A .* B); %  Use Matlab to do element by element multiplication of
 the contents of matrix A and matrix B.
```

```
Problem 1.a:
   -0.4294   -0.3237    1.3686
    0.9451   -0.0843   -3.2384
   -1.6316   -1.5631   -0.5779

Problem 1.b:
   -0.4294   -0.3237    1.3686
    0.9451   -0.0843   -3.2384
   -1.6316   -1.5631   -0.5779

Comparing my result with the result from part (a), the results are
 very consistent with mathematical expectations.
Problem 1.c:
   -1.2472    1.5326   -1.6736
    0.2433    0.4761    0.2887
   -0.5185    0.6084    1.4396

Problem 1.d:
   -0.3302   -0.2629    0.9332
    0.0398    1.6361    0.1469
    1.6236    1.6507   -0.6375

Comparing my result with the result from part (c), the results are
 very consistent with mathematical expectations
Problem 1.e:
   -0.3778   -0.3005    0.6638
   -0.0911   -0.0246    0.2367
    0.1293    2.2826    0.0740
```

clear all;

Problem 2:

Part A:

c for children, s for students and a for adults. a = (c + s) / 2; a + c + s == 900 4 * c + 6 * s + 8 * a == 5600

```
A = [ [1, -0.5, -0.5]; [1, 1, 1]; [8, 4, 6] ]; % Set up function
B = [0; 900; 5600]; % Set up function

%1)
fprintf('Problem 2.A.1:\n'); % Print with format
disp(A); % Display the matrices.
disp(B); % Display the matrices.

%2)
fprintf('Problem 2.A.2:\n'); % Print with format
disp(size(A)); % Display the matrices.
disp(size(B)); % Display the matrices.

%3)
fprintf('Problem 2.A.3:\nThe number of children attended the show
 is'); % Print with format
sol = A\B; % Solve the matrix
disp(sol(2)); % Disp the number of Children
```

```
Problem 2.A.1:
    1.0000   -0.5000   -0.5000
    1.0000    1.0000    1.0000
    8.0000    4.0000    6.0000

         0
       900
      5600

Problem 2.A.2:
     3     3

     3     1

Problem 2.A.3:
The number of children attended the show is   200
```

clear all;

Part B:

4x - y = 4 -6x + 2y = 4

```
A = [[4, -1]; [-6, 2]]; % Set up function
B = [4; 4]; % Set up function
sol = A\B;  % Solve the matrix

%1)
fprintf('Problem 2.B.1:\n'); % Print with format
disp(sol(1)); % display x
disp(sol(2)); % display y

%2)
```

```
fprintf('Problem 2.B.2:\n'); % Print with format
disp(det(A)); % Find and display the determinant D

%3)
fprintf('Problem 2.B.3:\nSince the right side of equations are all
 four, so if the determinant is 0, then there are infinite solutions;
 or contrarily, there is only one solution to the functions.\n'); %
 Print with format
if det(A) == 0
    fprintf('There are infinite solutions to the functions.\n'); %
 Print with format
else
    fprintf('There is only one solution to the functions.\n'); % Print
 with format
end

x = [0 : 0.001 : 10];
y1 = 4 * x - 4;
y2 = 3 * x + 2;
%Rewrite the equations above as equations of straight lines.

%4)
figure(1); % Set new figure
plot(x, y1, x, y2); % Draw plot
title('Problem 2.B.4: Plot the lines and find the point of
 intersection'); % Set title
xlabel('x'); % Set x label
ylabel('y'); % Set y label
legend('y1 = 4 * x - 4', 'y2 = 3 * x + 2'); % Set legend
disp('Problem 2.B.4:');
disp('I found out that in the plot the intersect is right at (6, 20).
 It is correspondent to our solution before.');
% Display my findings from the plot.

%5)
disp('Problem 2.B.5:');
disp('In 2.B.1, I solve the function by the law of matrix, and I found
 out the solution is that x is 6 and y is 20. In 2.B.5, I obeserved
 the plot and found out that the two lines intersect right at (6, 20),
 which proves the solution is correct.');
% Compare my solutions from the above methods and display my comments.
```

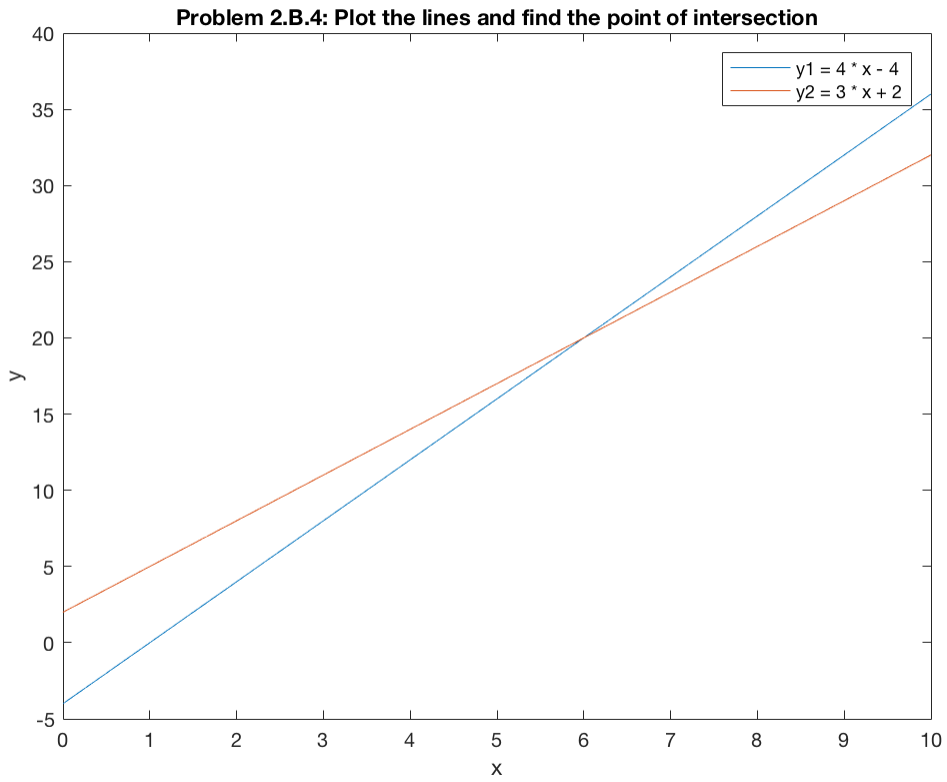
```
Problem 2.B.1:
    6.0000

   20.0000

Problem 2.B.2:
    2.0000

Problem 2.B.3:
Since the right side of equations are all four, so if the determinant
 is 0, then there are infinite solutions; or contrarily, there is only
 one solution to the functions.
```

There is only one solution to the functions.
Problem 2.B.4:
I found out that in the plot the intersect is right at (6, 20). It is correspondent to our solution before.
Problem 2.B.5:
In 2.B.1, I solve the function by the law of matrix, and I found out the solution is that x is 6 and y is 20. In 2.B.5, I obeserved the plot and found out that the two lines intersect right at (6, 20), which proves the solution is correct.



clear all;

Part C:

3x - y = 4 -6x + 2y = 4

```
A = [[3, -1]; [-6, 2]]; % Set up function
B = [4; 4]; % Set up function
sol = A\B;  % Solve the matrix

%1)
fprintf('Problem 2.C.1:\n'); % Print with format
disp(sol(1)); % display x
disp(sol(2)); % display y
```

```
%2)
fprintf('Problem 2.C.2:\n'); % Print with format
disp(det(A)); % Find and display the determinant D

%3)
fprintf('Problem 2.C.3:\nSince the right side of equations are all
 four, so if the determinant is 0, then there are infinite solutions;
 or contrarily, there is only one solution to the functions.\n'); %
 Print with format
if det(A) == 0
    fprintf('There are infinite solutions to the functions.\n'); %
 Print with format
else
    fprintf('There is only one solution to the functions.\n'); % Print
 with format
end

x = [0 : 0.001 : 10];
y1 = 3 * x - 4;
y2 = 3 * x + 2;
%Rewrite the equations above as equations of straight lines.

%4)
figure(2); % Set new figure
plot(x, y1, x, y2); % Draw plot
title('Problem 2.C.4: Plot the lines and find the point of
 intersection'); % Set title
xlabel('x'); % Set x label
ylabel('y'); % Set y label
legend('y1 = 3 * x - 4', 'y2 = 3 * x + 2'); % Set legend
disp('Problem 2.C.4:');
disp('I found out that in the plot the two lines has no intersect,
 which means that they are parallel. It is correspondent to our
 solution before.');
% Display my findings from the plot.

%5)
disp('Problem 2.C.5:');
disp('In 2.C.1, I solve the function by the law of matrix, and I found
 out that there are infinite solutions. In 2.C.5, I obeserved the
 plot and found out that the two lines are parallel, which proves the
 solution is correct.');
% Compare my solutions from the above methods and display my comments.

Warning: Matrix is singular to working precision.
Problem 2.C.1:
   Inf

   Inf

Problem 2.C.2:
     0

Problem 2.C.3:
```

Since the right side of equations are all four, so if the determinant is 0, then there are infinite solutions; or contrarily, there is only one solution to the functions.
There are infinite solutions to the functions.
Problem 2.C.4:
I found out that in the plot the two lines has no intersect, which means that they are parallel. It is correspondent to our solution before.
Problem 2.C.5:
In 2.C.1, I solve the function by the law of matrix, and I found out that there are infinite solutions. In 2.C.5, I obeserved the plot and found out that the two lines are parallel, which proves the solution is correct.

clear all;

Problem 3:

```
results=[10 30 20 50; 30 20 20 40; 50 50 30 10; 20 10 50 30; 40 40 40
 20];
category=['Category 1';'Category 2';'Category 3';'Category 4'];
robots=['A','B','C','D','E']';
% Pre-set data

%a)
lagt25 = logical(results(1, :) > 25); % Calculate logical array for
 robot A greater than 25
fprintf('Problem 3.a:\nThe categorys that robot A scores more than 25
 points are:\n'); % Print with format
disp(category(lagt25, :)); % Display answer

%b)
lc4gt35 = logical(results(:, 4) > 35); % Calculate logical array for
 Category 4 greater than 35
fprintf('Problem 3.b:\nThe robots that in category 4 score more than
 35 points are:\n'); % Print with format
disp(robots(lc4gt35, :)); % Display answer

%c)
lDbB = logical(results(2, :) < results(4, :)); % Calculate logical
 array for Categorys that robot D beat robot B
fprintf('Problem 3.c:\nThe categories that robot D beats robot B are:
\n'); % Print with format
disp(category(lDbB, :)); % Display answer

%d)
robots(3) = []; % Delete the robot name from the array, robots
results(3, :) = []; % Delete the points earned from matrix, results
disp('Problem 4.c:');
disp(results);
disp(robots);
% Display both after deletion.
```

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