```
%% Assignment3: NBEHBC course (Pre-assignment:4)
%  Student: Amit K Jaiswal
%  Date: 21-05-2017
% The function receives a vector and a value
corresponding to the number of
% permutations. It returns a list of mean surrogate
values and p-value. It
% also plots surrogate vector distribution histogram as
well as where the actual
% mean is (as a red vertical line).
function [sv_dist, p_val] = functA(vector,nperm)
for ii=1:nperm;
    rand_series=randi([0,1],1,length(vector));
    rand_series=rand_series*2-1;
    surrog_vector=rand_series.*vector;
    sv_dist(ii)= mean(surrog_vector);
end

    p_val = 1 - sum(sv_dist < mean(vector)) / nperm;
    display(['p_value=' num2str(p_val)]);

    figure('color', [1 1 1])
    histogram(sv_dist);
    hold on
    YLim = get(gca, 'ylim');
    plot([mean(sv_dist) mean(sv_dist)],
YLim,'r','linewidth', 2);
    title('Surrogate vector mean distribution');

end
%%%%%%%%%%% END
```

```
%% Assignment3: NBEHBC course (Pre-assignment:4)
%  Student: Amit K Jaiswal
%  Date: 22-05-2017
% The function receives as input two vectors and a
value corresponding to a
% number of permutations. The function should then, at
each permutation,
% swap a subset of values between the two vectors and
compute the mean difference.
% The function should return the list of surrogate
values. It also plots the
% distribution of the surrogates (histogram) as well as
where the unpermuted
% difference of the means is (as a red vertical line).
function [sv_dist, p_val] = functB(vector1,vector2,
nperm)

if ~isequal(length(vector1),length(vector2))
   display('Input vector dimension mismatch');
   return
end

for ii=1:nperm;
    rand_series1=randi([0,1],1,length(vector1));
    rand_series1=rand_series1*2-1;
    rand_series2=-rand_series1;
    sv_dist(ii)= mean(rand_series1.*vector1)+
mean(rand_series2.*vector2);
end

p_val = 1-sum(sv_dist<mean(vector2-vector1))/nperm;
display(['p_value=' num2str(p_val)]);

figure('color', [1 1 1])
histogram(sv_dist)
hold on
YLim = get(gca, 'ylim');
plot([mean(vector2-vector1)  mean(vector2-vector1)],
YLim,'r','Linewidth', 2)
```

```
title('Mean difference distribution');

end



%% Assignment3: NBEHBC course (Pre-assignment:4)
%  Student: Amit K Jaiswal
%  Date: 22-05-2017
%% Define input arguments
vector=rand(1,20)*25;
vector1=rand(1,20)*35;
vector2=rand(1,20)*45;
nperm = 100;

%% Test function A
[sv_dist1, p_val1] = functA(vector,nperm);

%% Test function B
[sv_dist2, p_val2] = functB(vector1,vector2,nperm);
```