Question 1

```
%% question1
vector = 5 * randn(500, 1) + 2;
sample_mean = mean(vector);
sample_std = std(vector);
% Display the sample mean and standard deviation
disp(['Sample mean: ', num2str(sample_mean)]);
disp(['Sample standard deviation: ', num2str(sample_std)]);
```

Question 2

```
% Number of coin flips
num_flips = 5000;
% Simulate coin flips (0 for tails, 1 for heads)
coin_flips = round(rand(1, num_flips));
% Calculate the running estimate of the probability of getting 'heads'
running_prob_heads = cumsum(coin_flips) ./ (1:num_flips);
% Plot the running estimate
plot(1:num_flips, running_prob_heads);
hold on;
% Plot a horizontal line at the expected value of 0.5
plot([1, num_flips], [0.5, 0.5], 'r');
% Add labels and title
xlabel('Number of Coin Flips');
ylabel('Probability of Heads');
title('Sample Probability of Heads in n flips of a simulated coin');
% Show legend
legend('Sample Probability', 'Fair Coin', 'Location', 'southeast');
% Hold off to prevent further plotting on this figure
hold off;
```

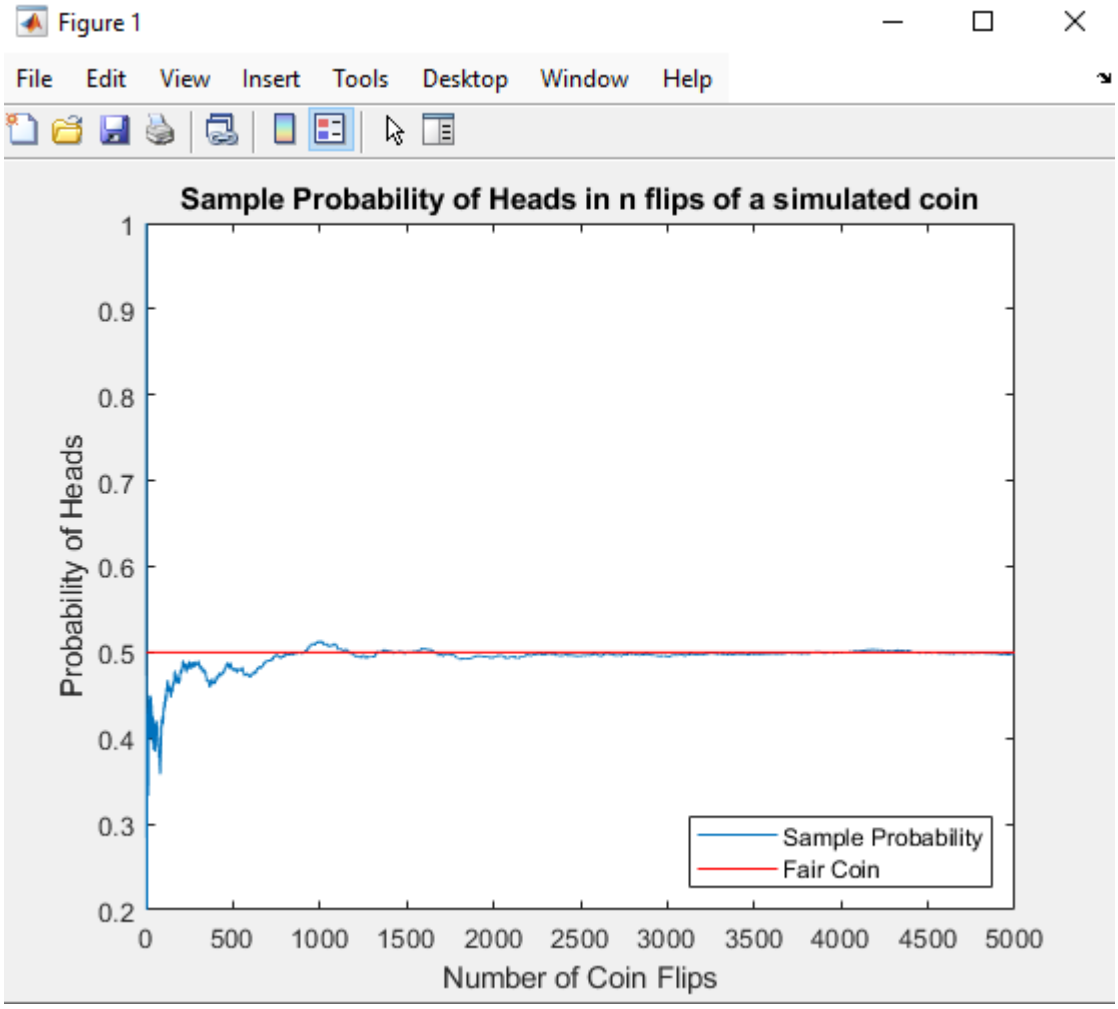
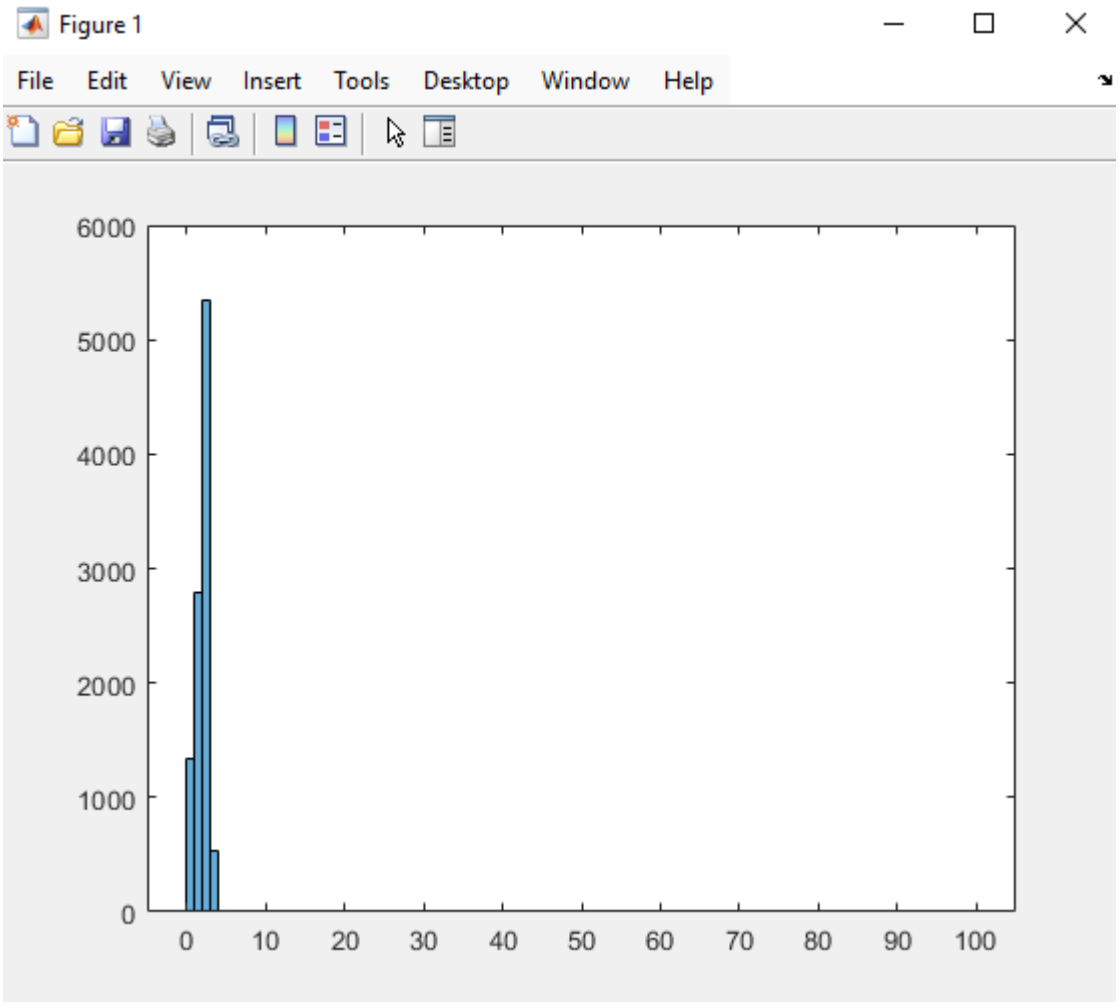


Figure 1
File Edit View Insert Tools Desktop Window Help
Sample Probability of Heads in n flips of a simulated coin
Probability of Heads
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000
Number of Coin Flips
Sample Probability
Fair Coin

Question 3

```
% Load the poisson_workaround script to define poissrnd2 function
poisson_workaround;
% Generate 1000 Poisson distributed random numbers with parameter λ = 5
lambda = 5;
num_samples = 1000;
poisson_samples = zeros(num_samples, 1);
% Use the workaround function poissrnd2 to generate Poisson samples
for ii = 1:num_samples
poisson_samples(ii) = poissrnd2(lambda);
end
% Get the histogram of the data and normalize the counts
[N, X] = hist(poisson_samples, unique(poisson_samples));
probability_mass_function = N / sum(N);
% Plot the normalized histogram as a bar graph
bar(X, probability_mass_function);
hold on;
% Plot the actual Poisson probability mass function with λ = 5
x_values = 0:max(X);
poisson_pmf = poisspdf2(x_values, lambda);
plot(x_values, poisson_pmf, 'r-', 'LineWidth', 2);
% Add labels and title
xlabel('Number of Occurrences');
ylabel('Probability');
title('Poisson Probability Mass Function');
% Add legend
legend('Normalized Histogram', 'Poisson PMF (\lambda = 5)', 'Location', 'north
east');
% Hold off to prevent further plotting on this figure
hold off;
```



Question 4

```
% a. Create a 3x3 cell array
employees = {'Joe', 'Sarah', 'Pat'; ...
'Smith', 'Brown', 'Jackson'; ...
30000, 150000, 120000};
% Display the cell array
employees_transposed = employees';
% Display the transposed cell array
disp(employees_transposed);
% b. Change Sarah's last name to 'Meyers'
employees{2, 2} = 'Meyers';
% Display the cell array after the change
employees_transposed = employees';
% Display the transposed cell array
disp(employees_transposed);
% c. Increase Pat's salary by $50,000
pat_index = strcmp(employees(1, :), 'Pat');
employees{3, pat_index} = employees{3, pat_index} + 50000;
% Display the cell array after the salary change
employees_transposed = employees';
% Display the transposed cell array
disp(employees_transposed);
```

```
>> q4
    {'Joe'   }    {'Smith'   }    {[ 30000]}
    {'Sarah'}    {'Brown'   }    {[150000]}
    {'Pat'   }    {'Jackson'}    {[120000]}

    {'Joe'   }    {'Smith'   }    {[ 30000]}
    {'Sarah'}    {'Meyers'  }    {[150000]}
    {'Pat'   }    {'Jackson'}    {[120000]}

    {'Joe'   }    {'Smith'   }    {[ 30000]}
    {'Sarah'}    {'Meyers'  }    {[150000]}
    {'Pat'   }    {'Jackson'}    {[170000]}
```

Question 6

```
% b. Create variables x and y
x = 0:0.1:2*pi;
y = sin(x);
% c. Create a new figure and plot
figure;
plot(x, y, 'r');
% d. Set x limit
xlim([0, 2*pi]);
% e. Set xtick and xticklabel
set(gca, 'xtick', [0, pi, 2*pi], 'xticklabel', {'0', '\pi', '2\pi'});
% f. Set ytick
set(gca, 'ytick', -1:0.5:1);
% g. Turn on grid
grid on;
% h. Set colors of axis
set(gca, 'xcolor', 'cyan', 'ycolor', 'green', 'color', 'k');
% i. Set color of figure
set(gcf, 'color', [.3 .3 .3]);
% j. Add title
title({'One sine wave from 0 to 2\pi'}, 'FontSize', 14, 'FontWeight', 'bold',
'Color', 'w');
% k. Add x and y labels
xlabel({'X values in terms of π'}, 'FontSize', 12, 'Color', 'cyan');
ylabel({'sin(x)'}, 'FontSize', 12, 'Color', 'green');
```

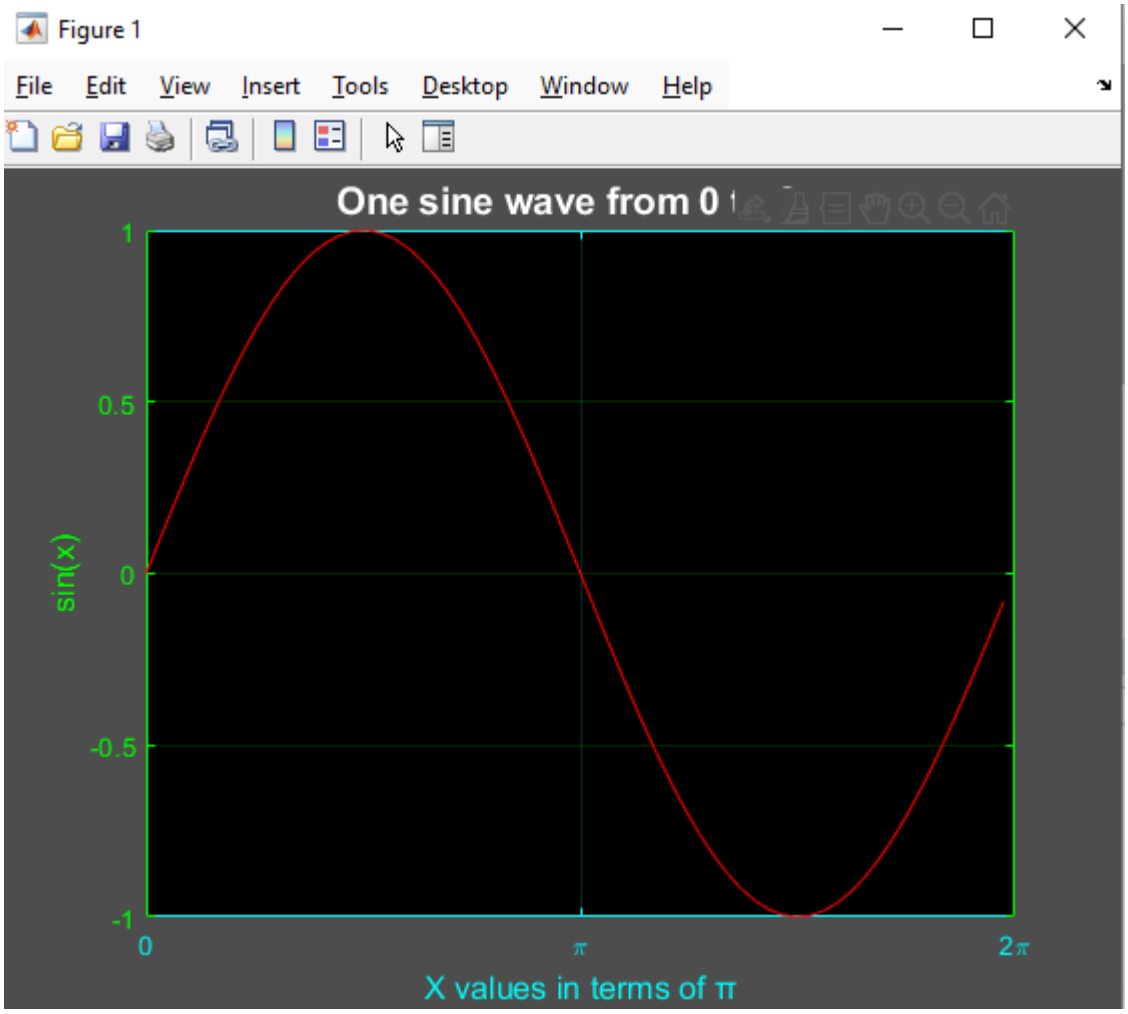


Figure 1
File Edit View Insert Tools Desktop Window Help
One sine wave from 0
1
0.5
0
-0.5
-1
sin(x)
0
π
2π
X values in terms of π