```
% Given data points
x = [0.6, 1.5, 1.6, 2.5, 3.5];
f_x = [0.9036, 0.3734, 0.3261, 0.08422, 0.01596];

% Compute the first derivative using central differences
n = length(x);
f_prime_estimates = zeros(1, n);

for i = 2:n-1
    h_i = (x(i+1) - x(i-1))/2; % Central difference
    f_prime_estimates(i) = (f_x(i+1) - f_x(i-1)) / (2 * h_i);
end

% First derivative estimates at boundaries (forward/backward differences)
f_prime_estimates(1) = (f_x(2) - f_x(1)) / (x(2) - x(1)); % Forward difference at first point
f_prime_estimates(n) = (f_x(n) - f_x(n-1)) / (x(n) - x(n-1)); % Backward difference at last point

% True derivatives
true_derivatives = 5e-2 * x;

% Compare results
fprintf('x\t\tTrue Derivative\tEstimated Derivative\n');
fprintf('-------------------------------------------\n');
for i = 1:n
    fprintf('%.2f\t\t%.4f\t\t%.4f\n', x(i), true_derivatives(i), f_prime_estimates(i));
end
```

```
x               True Derivative Estimated Derivative
-------------------------------------------
0.60            0.0300          -0.5891
1.50            0.0750          -0.5775
1.60            0.0800          -0.2892
2.50            0.1250          -0.1632
3.50            0.1750          -0.0683
```

Published with MATLAB® R2023b