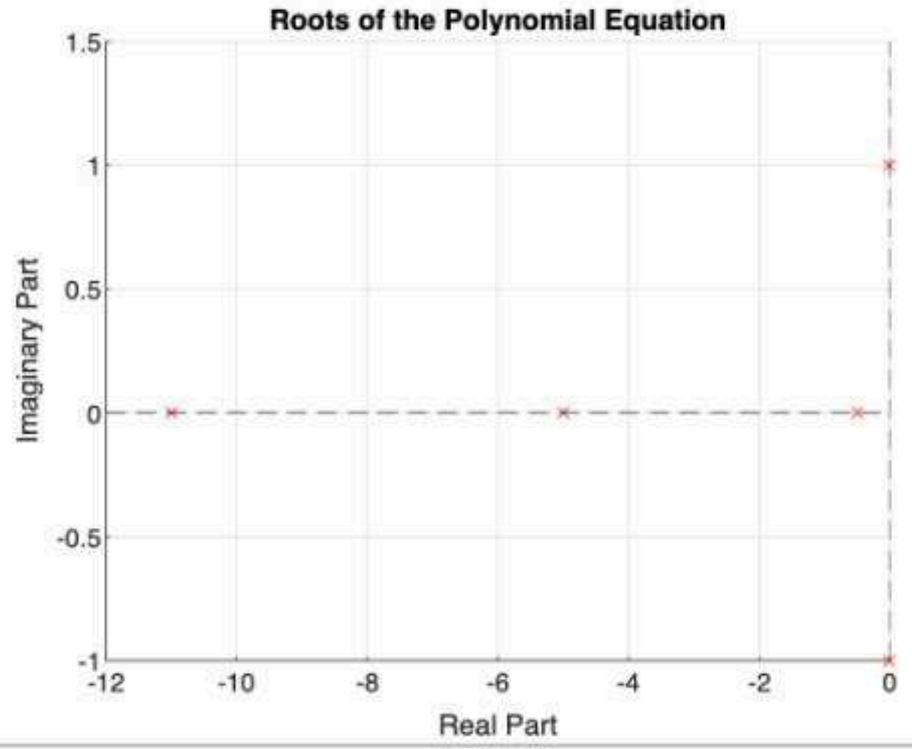
NBodySimulationPart2.m | test.m

/MATLAB Drive/test.m

```
syms t s a b;
%Q1

% Coefficients of the polynomial equation
coefficients = [2, 33, 128, 88, 126, 55];

% Calculate the roots of the polynomial equation
roots = roots(coefficients);

disp('Roots of the equation:');
disp(roots);

% Plot the roots in the complex plane
figure;
scatter(real(roots), imag(roots), 'rx');
hold on;
plot([0 0], ylim, 'k--', 'LineWidth', 0.5);
plot(xlim, [0 0], 'k--', 'LineWidth', 0.5);
xlabel('Real Part');
ylabel('Imaginary Part');
title('Roots of the Polynomial Equation');
grid on;
hold off;



%Q2
```

Figure 1



Command Window

```
(5*exp(-5*t)*(12*t + 4*exp(2*t) + 3*exp(4*t) - 7))/16

Inverse Laplace Transform of F3:
exp(-t)/4 - exp(-2*t)/3 + exp(-5*t)/12

>> test
Roots of the equation:
 -11.0000 + 0.0000i
  -5.0000 + 0.0000i
  -0.0000 + 1.0000i
  -0.0000 - 1.0000i
  -0.5000 + 0.0000i
```

/MATLAB Drive/test.m

```
29
30      %Q2
31      % Define the function
32      f_t = t^2 * exp(-2 * t) * sin(t);
33      g_t = t * exp(a * t) * cos(b * t);
34      h_t = sin(4*t)/t;
35      % Calculate the Laplace transform
36      laplace_transform1 = laplace(f_t, t, s);
37
38      laplace_transform2 = laplace(g_t, t, s);
39
40      laplace_transform3 = laplace(h_t, t, s);
41
42      % Simplify the result
43      laplace_transform_simplified1 = simplify(laplace_transform1);
44
45      laplace_transform_simplified2 = simplify(laplace_transform2);
46
47      laplace_transform_simplified3 = simplify(laplace_transform3);
48
49      % Display the result
50      disp('Laplace Transform of f(t):');
51      disp(laplace_transform_simplified1);
52
53      disp('Laplace Transform of g(t):');
54      disp(laplace_transform_simplified2);
55
56      disp('Laplace Transform of h(t):');
57      disp(laplace_transform_simplified3);
58
59      %Q3
60
61      F1 = (2 * (s - 1) * exp(-2 * s)) / (s*s - 2 * s + 2);
```

Command Window

```
Laplace Transform of f(t):
(2*(2*s + 4)^2)/((s + 2)^2 + 1)^3 - 2/((s + 2)^2 + 1)^2

Laplace Transform of g(t):
((a - s)*(2*a - 2*s))/(b^2 + (a - s)^2)^2 - 1/(b^2 + (a - s)^2)

Laplace Transform of h(t):
atan(4/s)
```

```
58
59  %Q3
60
61  F1 = (2 * (s - 1) * exp(-2 * s)) / (s*s - 2 * s + 2);
62
63  F2 = (10 * (s + 2) * (s + 4))/((s+1)*(s+3)*(s+5)*(s+5));
64
65  F3 = 1 / (s * s * s + 8 * s * s + 17 * s + 10);
66
67
68
69  f1 = simplify(ilaplace(F1));
70
71  f2 = simplify(ilaplace(F2));
72
73  f3 = simplify(ilaplace(F3));
74
75
76  disp('Inverse Laplace Transform of F1:');
77  disp(f1);
78
79  disp('Inverse Laplace Transform of F2:');
80  disp(f2);
81
82  disp('Inverse Laplace Transform of F3:');
83  disp(f3);
84
85
```

Command Window

```
Inverse Laplace Transform of F1:
2*cos(t - 2)*heaviside(t - 2)*exp(t - 2)

Inverse Laplace Transform of F2:
(5*exp(-5*t)*(12*t + 4*exp(2*t) + 3*exp(4*t) - 7))/16

Inverse Laplace Transform of F3:
exp(-t)/4 - exp(-2*t)/3 + exp(-5*t)/12
```