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1 %{
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3 ECE 202
4 Exercise M8
5 11/15/2023
6 the purpose of this script is to find the three coefficients, c1, c2, and c3.
7 when doing partial fraction decomposition
8
9 %}
10 %initialize
11 clear
12
13 %givens (create system of equations in terms of all 3 variables)
14 A=[1 1 1;
15     -5 -4 -3;
16     6 3 2]; % 3 x 3 matrix representing (6x^2+5x+4)/((x-1)(x-2)(x-3))
17
18 b=[6; 5; 4]; % create column matrix of the constants in the equation 6x^2+5x+4
19
20 %Calculation
21
22 r = A^(-1)*b %calculate the 3 numerators
23
24 %Checks
25
26 %given
27 while 1 %loop infinitely
28     n = input('input number of test numbers (input 0 to break): ');
29     %ask user how many test inputs to use
30     if n == 0 %check if input == 0
31         fprintf('Exiting Simulation.\n') %tell user what happening
32         break %exit loop
33     end
34     xmin = -4; %min value of x
35     xmax = 4; %max value of x
36     x = linspace(xmin,xmax,n); %make array of values between xmin and xmax with
37     %number of steps
38
39     %initialize values of denominators
40     d1 = x-1;
41     d2 = x-2;
42     d3 = x-3;
43
44     %calculation
45     n = 6.*x.^2+5*x+4; %calculate numerator values
46     y1 = n./(d1.*d2.*d3); %calculate the numerical value of equation with fraction
47     % decomposition
48     y2 = r(1)./d1 + r(2)./d2 + r(3)./d3; %calculate numerical value of equation
49     % with original formula
50     check = sum(abs(y1) - abs(y2)) %compare values, should be close to
51     % zero because values are equiv
```

52 end

53

54 %the reason the check sometimes returns NaN is because the linspace set
55 %will contain the roots of the equation, you are unable to divide by zero
56 %so the check will return an error value. with linspace 5, the set will
57 %contain -4, -2, 0, 2, 4
58 %2 is in this set, and 2 is a root.