MAT 275 Project 5

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Problem 1. Laplace Transforms and Symbolic Math Toolbox (Project 5)

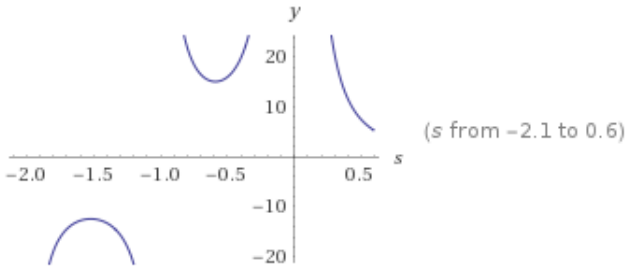
This homework focuses on the following function:

$$Y(s) = \frac{4s^2 + 4s + 4}{s^2 * (s^2 + 3s + 2)}$$

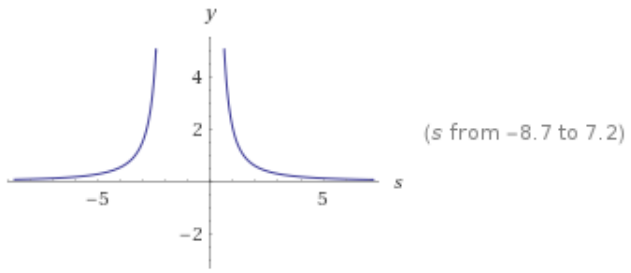
Input:

$$Y(s) = \frac{4\,s^2 + 4\,s + 4}{s^2\,(s^2 + 3\,s + 2)}$$

Plots:



(s from −2.1 to 0.6)



(s from −8.7 to 7.2)

Solution

This project asks for the following:

(a) Residues and poles of $Y(s)$, and the partial fraction decomposition, which is $\frac{2}{s^2} + \frac{4}{s+1} + \frac{3}{s+2} + \frac{1}{s}$.

(b) The Inverse Laplace Transform of $Y(s)$ from a table, which is $2t - 3e^{-2t} + 4e^{-t} - 1$.

(c) Checking the Laplace Transform of $Y(s)$ by taking a computational Inverse Laplace Transform, which also gives $2t - 3e^{-2t} + 4e^{-t} - 1$ (equivalently).