ECE 3337: Signals & Systems Analysis, Class Worksheet – Lecture 12

1. (100 pts) Using partial-fraction-expansions, convert the following Laplace-domain signals to the time domain. Make sure to show your steps and reasoning. Make sure to also verify your answers using a software tool, e.g., Mathematica/MATLAB/Wolfram Alpha/etc.

a) $\mathbf{X(s)} = \frac{7\mathbf{s}+20}{(\mathbf{s}+1)(\mathbf{s}+6)}$

b) $\mathbf{X(s)} = \frac{2(\mathbf{s}^3+12\mathbf{s}^2+16)}{(\mathbf{s}+1)(\mathbf{s}+4)^3}$

c) $\mathbf{X(s)} = \frac{\mathbf{s}(\mathbf{s}-8)e^{-6\mathbf{s}}}{(\mathbf{s}+2)(\mathbf{s}^2+16)}$

d) $\mathbf{X(s)} = \frac{7\mathbf{s}+20}{(\mathbf{s}+3)(\mathbf{s}+7)}$

e) $\mathbf{X(s)} = \frac{6\mathbf{s}^2+19\mathbf{s}+18}{(\mathbf{s}+1)^2(\mathbf{s}+2)}$

f) $\mathbf{X(s)} = \frac{7\mathbf{s}^3+54\mathbf{s}^2+141\mathbf{s}+128}{(\mathbf{s}+2)^2(\mathbf{s}+3)(\mathbf{s}+4)}$

g) $\mathbf{X(s)} = \frac{8\mathbf{s}^2+20\mathbf{s}+72}{(\mathbf{s}^2+4\mathbf{s}+5)^2}$

h) $\mathbf{X(s)} = \frac{(\mathbf{s}^2+6\mathbf{s}+15)(s+2)}{(\mathbf{s}-1)(\mathbf{s}^2+4\mathbf{s}+20)}$

i) $\mathbf{X(s)} = \frac{8\mathbf{s}^4+20\mathbf{s}+72}{(\mathbf{s}^2+4\mathbf{s}+20)}$

j) $\mathbf{X(s)} = \frac{4s^3+17s^2+91s+211)}{(\mathbf{s}^2+6\mathbf{s}+25)^2}$