Results

Problem 1

1F, 2H, 3G, 4E, 5B, 6C, 7D, 8A

Problem 2

2.1 $X(f) = \sum_{k=-\infty}^{+\infty} c_k \cdot \delta\left(f - k/T\right)$ with $c_k = a \cdot b \cdot \mathrm{si}\left(k \cdot a \cdot \pi\right)$

2.2 $a = 0.2$; $a = 0.8$: $\hat{x}_1 = 0.374 \cdot b$; $a = 0.5$: $\hat{x}_{1,\max} = 0.637 \cdot b$

Problem 3

3.1 $y(t) = -x\left(t\right) + 2 \cdot \left\{\left(u(t) \cdot \mathrm{e}^{-t}\right) * x(t)\right\}$

3.2 $h(t) = -\delta(t) + 2 \cdot u(t) \cdot \mathrm{e}^{-t}$

3.3 $p = -1$ → stable

Problem 4

4.1 $X\left[k\right] = -2 \cdot \cos\left(k \cdot \pi/3\right) + 4 \cdot \cos\left(k \cdot 2\pi/3\right) + 4 \cdot \left(-1\right)^k$

4.2 $E = 6 \cdot 26 = 156$

Problem 5

5.1 $Y\left(z\right) = \dfrac{1}{\left(3 - 4 \cdot z^{-1} + z^{-2}\right) \cdot \left(1 - 0.5 \cdot z^{-1}\right)}$; ROC: $\left|z\right| > 1$

5.2 $y\left[n\right] = \left\{1 + \left(\dfrac{1}{3}\right)^{n+1} - \left(\dfrac{1}{2}\right)^{n}\right\} \cdot u\left[n\right]$

5.3 no

Problem 6

6.1 nonlinear, time invariant, $n_0 > 0$: not causal, $n_0 \le 0$: causal

6.2 nonlinear, time invariant, causal

6.3 linear, time variant, causal

6.4 linear, time variant, causal

Problem 7

$T_o > 1$ s