

Solutions to EE3210 Quiz 3 Problems

Problem 1:

- (a) The system is memoryless. Only the current value of the input $x[n]$ influences the current value of the output $y[n]$.
- (b) The system is causal, since it is memoryless.
- (c) The system is stable. For $0 < B < \infty$, given $|x[n]| \leq B$ for all n , we have $|(-1)^{n-1}x[n]| = |(-1)^{n-1}||x[n]| = |x[n]| \leq B$, and therefore $|y[n]| \leq B$.

Problem 2: Note that $x_2(t) = x_1(t) - x_1(t - 1)$. Therefore, using linearity and time invariance, we get $y_2(t) = y_1(t) - y_1(t - 1)$. The two signals $y_1(t)$ and $-y_1(t - 1)$ overlap in the interval $1 < t < 2$. In particular, when $1 < t < 2$, $y_1(t) = -2t + 4$, $-y_1(t - 1) = -2t + 2$. Thus, $y_2(t) = -4t + 6$ when $1 < t < 2$. The signal $y_2(t)$ is shown in the figure below.

