

L 3.109 Determine whether each system \mathcal{H} given below is invertible.

- (a) $\mathcal{H}x(t) = \cos[x(t)]$;
- (b) $\mathcal{H}x(t) = x * x(t)$, where $f * g(t) = \int_{-\infty}^{\infty} f(\tau)g(t - \tau)d\tau$;
- (c) $\mathcal{H}x(t) = \text{Even}x(t)$;
- (d) $\mathcal{H}x(t) = \text{Re}x(t)$;
- (e) $\mathcal{H}x(t) = |x(t)|$;
- (f) $\mathcal{H}x(t) = 2x(t) + 3$;
- (g) $\mathcal{H}x(t) = x(t) + x(t - 1)$;
- (h) $\mathcal{H}x(t) = 2\text{Even}\{x\}(t) - \text{Odd}\{x\}(t)$; and
- (i) $\mathcal{H}x(t) = ax(t) + b$, where a and b are real constants.

Short Answer. (a) not invertible; (b) not invertible; (c) not invertible; (d) not invertible; (e) not invertible; (f) invertible; (g) not invertible; (h) invertible; (i) invertible if and only if $a \neq 0$