

1. **(7 Pts Total)** Consider the system given by:  $y(t) = \cos[x(t)]$ .
- (a) **(1 pt)** Is the system linear (yes or no)?
  - (b) **(1 pt)** Is the system time-invariant (yes or no)?
  - (c) **(1 pt)** Is the system BIBO stable (yes or no)?
  - (d) **(1 pt)** Is the system causal (yes or no)?
  - (e) **(1 pt)** Is the system invertible (yes or no)?
  - (f) **(2 pts)** Provide justification for *one* of your answers above.

2. **(7 Pts Total)** Repeat the above for the system:  $y[n] = nx[n]$ .

3. **(6 Pts Total)** A linear time-invariant (LTI) system has impulse response

$$h[n] = 3\delta[n] + 2\delta[n - 1] + \delta[n - 2].$$

- (a) **(3 pts)** Determine the output,  $y[n]$ , when the input is  $x[n] = 2\delta[n] + 2\delta[n - 10]$ .
  - (b) **(3 pts)** Determine the output,  $y[n]$ , when the input is  $x[n] = \delta[n] - \delta[n - 1]$ .
4. **(2 Pts Extra Credit)** Give an example of a system which is NOT linear, NOT time-invariant, NOT BIBO stable, NOT causal, and NOT invertible.