ECE 301 Quiz 1.

6/23 (Tue)

Consider a system,

$$y(t) = t\,x(t).$$

First, determine if the system in linear.
Second, determine if it is time-invariant.

[Answer]
1) Linear!

(input) (output)
x1(t) -> t x1(t)
x2(t) -> t x2(t)
linear sum = a1 t x1(t) + a2 t x2(t) … (a)

(input) (output)
a1x1(t) + a2x2(t) -> t { a1x1(t) + a2x2(t) } … (b)

Since eq. (a) = (b), the system is linear.

2) Not time-invariant!

(input) (output)
x(t-t0) -> t x(t-t0) … (c)

(substitute t-t0 in y(t))
y(t-t0) = (t-t0) x(t-t0) … (d)

Since eq. (c) != (d), the system is not time-invariant.