2)

$$y(t) = (P_\alpha u)(t) = \begin{cases} u(t), & t \le \alpha \\ 0, & t > \alpha \end{cases}$$

a) The system is Linear w/in two Pts/rns

For $t \le \alpha$:

$y(u(\alpha - t_1)) = u(\alpha - t_1)$

$y(\beta_1 u_1(\alpha - t_1) + \beta_2 u_2(\alpha - t_1)) = \beta_1 u_1(\alpha - t_1) + \beta_2 u_2(\alpha - t_1)$

y(t) satisfies Superposition

For $t > \alpha$:

$y(u(\alpha + t_1)) = 0$

$y(\beta_1 u_1 + \beta_2 u_2) = 0$ } satisfies Superposition

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b) The System is Time-Varient

Let $u(t) = \beta t$, where β is a Constant

$y(u(\alpha - t_1)) = \beta(\alpha - t_1)$

$y(u(\alpha + t_1)) = 0$ } Time Varient

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c) The System is Causal

y(u) is not dependent on any future values of u(t). //