Consider the CDF (Cumulative Distribution Function),
\[ F(t) = \begin{cases} 
0, & t < 0, \\
t^2, & 0 \leq t \leq 1, \\
1, & 1 \leq t. 
\end{cases} \]

Let \( U \) be a uniform random variable on \([0,1]\). Find a function, \( g(\cdot) \), such that \( X = g(U) \) has the CDF \( F(\cdot) \):

\[ g(u) = \]

For each of the following continuous time LTI systems, write the impulse response:

(a) A system that “delays the input by 3 time units”:

\[ h(t) = \]

(b) A system that integrates the input (starting from time 0). That is \( \mathcal{O}(u(t)) = \int_0^t u(\tau) \, d\tau \):

\[ h(t) = \]

(c) A system that superimposes (adds) the input with a delayed input, where the delay is by one time unit:

\[ h(t) = \]