1. (a) The rule may be written

\[
y(t) = \int_{-\infty}^{\infty} (t - \lambda)u(t - \lambda)x(\lambda) d\lambda
\]

\[
= \int_{-\infty}^{\infty} h(t - \lambda)x(\lambda) d\lambda
\]

with \( h(t) = tu(t) \), showing that the system is linear, time-invariant, and causal, and that it has memory.

(b) The rule may be written

\[
y(t) = \int_{-\infty}^{\infty} \lambda u(t - \lambda)x(\lambda) d\lambda
\]

\[
= \int_{-\infty}^{\infty} g(t, \lambda)x(\lambda) d\lambda
\]

with \( g(t, \lambda) = \lambda u(t - \lambda) \), showing that the system is linear, that it is time-varying (since \( g(t, \lambda) \) cannot be written as \( h(t - \lambda) \)), that it is causal (since \( g(t, \lambda) = 0 \) if \( \lambda > t \)), and that it has memory.

2. (a) Since the rule has the form

\[
y(t) = \int_{-\infty}^{\infty} h(t - \lambda)x(\lambda) d\lambda
\]

with \( h(t) = e^{-t}u(t) \), it is linear.

(b) Since \( h(t) = 0 \) for \( t < 0 \), it is causal.

3. (a) Since the rule has the form

\[
y(t) = \int_{-\infty}^{\infty} h(t - \lambda)x(\lambda) d\lambda
\]

with \( h(t) = e^{-(t+1)}u(t + 1) \), it is linear.

(b) Since \( h(t) \neq 0 \) for \(-1 < t < 0\), it is noncausal.

4. Since the rule has the form

\[
y(t) = \int_{-\infty}^{\infty} h(\lambda)x(t - \lambda) d\lambda
\]

with

\[
h(\lambda) = (1 - |\lambda|) (u(\lambda + 1) - u(\lambda - 1)) ,
\]

or

\[
h(t) = (1 - |t|) (u(t + 1) - u(t - 1)) ,
\]

it is causal if and only if \( h(t) = 0 \) for all \( t < 0 \). But here we can see that \( h(t) \neq 0 \) for all \( t \) between \(-1\) and \(+1\), so that the system must be noncausal.