Problem 1.31 in Oppenheim/Willsky/Nawab

ECE-220 Problem 2-1  (Old ECE 220 exam question)
Consider the system defined by
\[ y(t) = tx(t + 1). \]
(a) Is this system linear? Why or why not? Justify your answer.
(b) Is this system time invariant? Why or why not? Justify your answer.
(c) Is this system stable? Why or why not? Justify your answer.
(d) Is this system causal? Why or why not? Justify your answer.

ECE-220 Problem 2-2
Consider the system defined by
\[ y(t) = x(t/3) - 2. \]
(a) Is this system linear? Why or why not? Justify your answer.
(b) Is this system time invariant? Why or why not? Justify your answer.
(c) Is this system stable? Why or why not? Justify your answer.
(d) Is this system causal? Why or why not? Justify your answer.

ECE-220 Problem 2-3
(a) The signal \( y(t) \) is defined as follows:
\[ y(t) = \int_{-\infty}^{t} x(\tau)d\tau. \]
Suppose that \( x(t) = tu(t) \). First sketch \( x(t) \). Then determine and sketch \( y(t) \).
(b) Consider the signal \( p(t) = \sum_{n=-\infty}^{+\infty} \delta(t - 2n) \). First sketch \( p(t) \). Then calculate the following integral
\[ \int_{-3}^{27} p(\tau)d\tau. \]

ECE-220 Problem 2-4
Consider the following signals
\[ x(t) = u(t + 1) - u(t - 1) \]
\[ h(t) = 3 \left( u(t - 2) - u(t - 5) \right). \]
(a) Sketch \( h(t) \) and \( x(t) \).
(b) Determine and sketch \( y(t) = x(t) * h(t) \).
Problem Set #: _____

Name: ____________________________________________

Names of other students I discussed this problem set with:

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Provide a brief (one-sentence) description of how much of each problem has been completed:

________________________________________________________________________

Amount of time spent on this problem set: ____________________________

If problem set is incomplete, how much additional time would be needed to complete it? ____________________________