Calculators and computers are not allowed. You must show your work to receive credit.
1) **(22 points)** Fill in the non-shaded part of the following table.

<table>
<thead>
<tr>
<th></th>
<th>Linear? (Y/N)</th>
<th>Time Invariant? (Y/N)</th>
<th>BIBO Stable? (Y/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y(t) = \cos(t)x(t) )</td>
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<tr>
<td>( \dot{y}(t) + y(t) = e^{-t}x(t) )</td>
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<tr>
<td>( y(t) = x\left(\frac{t}{2}\right) )</td>
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<tr>
<td>( y(t) = \int_{-\infty}^{t} e^{\lambda}x(\lambda)d\lambda )</td>
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<tr>
<td>( y(t) = \cos\left(\frac{1}{x(t)}\right) )</td>
<td></td>
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<tr>
<td>( h(t) = \delta(t) )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( h(t) = u(t) )</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
2) **(20 points)** For the following interconnected systems, 

i) determine the overall impulse response (the impulse response between input $x(t)$ and output $y(t)$) and 

ii) determine if the system is causal.

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- **Parallel Connections:**
  
  a) $h_1(t) = \delta(t + 2)$, $h_2(t) = \delta(t - 1)$
  
  b) $h_1(t) = u(t + 1)$, $h_2(t) = u(t - 2)$

- **Series Connections:**
3) (18 Points) Determine the impulse response for the following systems. Don’t forget any necessary unit step functions

a) \( y(t) = x(t - 1) + x(t + 1) \)

b) \( y(t) = \int_{-\infty}^{t} e^{-(t-\lambda)} x(\lambda + 3) d\lambda \)

c) \( 2 \dot{y}(t) + y(t) = 3x(t) \)
4) **(15 points)** The input-output relationship for the following system can be written as

\[ y(t) * A(t) = x(t) * B(t) \]

Determine \( A(t) \) and \( B(t) \)
5) **(25 points)** Consider a linear time invariant system with impulse response given by

\[ h(t) = e^{-(t+1)}u(t+1) \]

The input to the system is given by

\[ x(t) = [u(t-1) - u(t-2)] - 2[u(t-3) - u(t-4)] \]

Using **graphical evaluation**, determine the output \( y(t) \). Specifically, you must

- Flip and slide \( h(t) \), NOT \( x(t) \)
- Show graphs displaying both \( h(t-\lambda) \) and \( x(\lambda) \) for each region of interest
- Determine the range of \( t \) for which each part of your solution is valid
- Set up any necessary integrals to compute \( y(t) \). Your integrals must be complete, in that they cannot contain the symbols \( x(\lambda) \) or \( h(t-\lambda) \) but must contain the actual functions.
- Your integrals cannot contain any unit step functions
- **DO NOT EVALUATE THE INTEGRALS!!**
Name _____________________________________________ Mailbox __________________