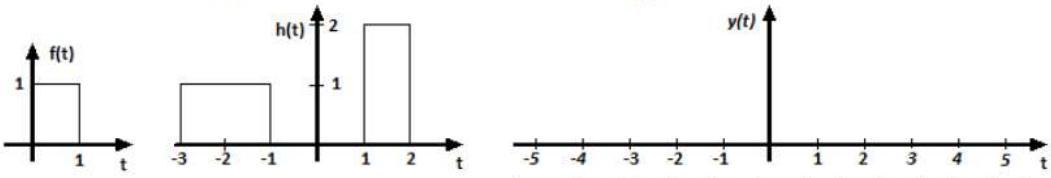
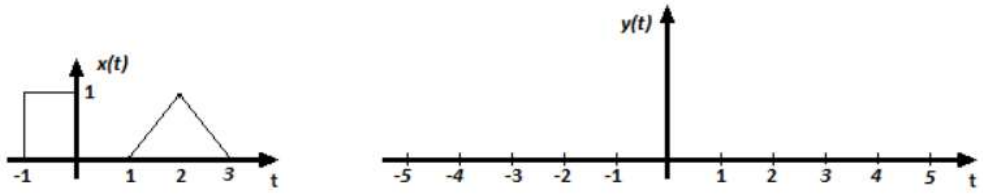
3. (25 pts) The two parts of this problem are unrelated.

(a) Consider the signal $y(t) = f(t) * h(t)$, where $f(t)$ and $h(t)$ are plotted below. Plot $y(t)$ for $-5 < t < 5$ and fill in the table for the value of $y(t)$.



t	-5	-4	-3	-2	-1	0	1	2	3	4	5
y(t)											

(b) Consider the signal $x(t) = m(t) * h(t)$ plotted below.
Plot the signal $y(t) = \left(\frac{d}{dt}m(t)\right) * h(t-2)$.



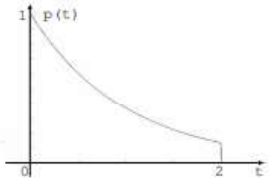
Problem 3 continued

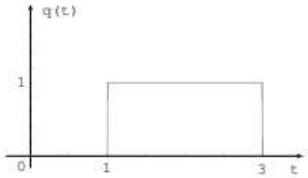
c) (9 points) Find and sketch $y(t) = f(t) * h(t)$ for

$$f(t) = \text{sinc}(0.1\pi t), \quad h(t) = \text{sinc}(0.2\pi t)$$

3. (25 pts) The two parts in this problem are unrelated.

(a) Given $p(t) = e^{-t}rect(\frac{t-1}{2})$ and $q(t) = rect(\frac{t-2}{2})$, determine the following convolutions.





i. $y(t) = p(t) * q(t)$

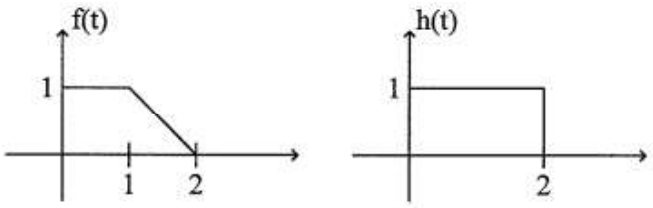
$y(t) =$ _____

ii. $z(t) = \frac{dp(t)}{dt} * q(t)$

(b) For a LTI system, if input $f_0(t) = u(t)$ produces output $y_0(t) = rect(\frac{t-1}{2})$, determine the output $y(t)$ to the input $f(t) = rect(t)$.

Problem 3

(a) For h(t) and f(t) shown below, compute the specified values for $y(t) = f(t) * h(t)$



$y(-0.5) =$ _____ $y(0.5) =$ _____

$y(1.5) =$ _____ $y(2.5) =$ _____

$y(3.5) =$ _____ $y(4.5) =$ _____

(b) Let $h(t) = e^{-2t}u(t)$ and $f(t) = u(t-4)$. Find $y(t) = f(t) * h(t)$ for all values of t.

$y(t) =$