

Solution of ECE 315 Test 6 F06

1. If $y(t) = \text{tri}(t/8) * 4\delta(t+3)$, what is the numerical value of $y(0)$?

$$y(0) = \underline{2.5}$$

$$y(t) = \text{tri}(t/8) * 4\delta(t+3) = 4 \text{tri}((t+3)/8)$$

$$y(0) = 4 \text{tri}(3/8) = 4(1 - 3/8) = 20/8 = 2.5$$

2. If $y(t) = \text{rect}(t/6) * [\delta(t) - 2\delta(t-2)]$, what is the numerical value of $y(2)$?

$$y(2) = \underline{-1}$$

$$y(t) = \text{rect}(t/6) * [\delta(t) - 2\delta(t-2)] = \text{rect}(t/6) - 2\text{rect}((t-2)/6)$$

$$y(2) = \text{rect}(2/6) - 2\text{rect}((2-2)/6) = \text{rect}(1/3) - 2\text{rect}(0) = 1 - 2 = -1$$

3. If $y(t) = -3\text{rect}(t/2) * \text{rect}((t-3)/2)$, what are the numerical maximum and minimum values of y for all time? Maximum = 0, Minimum = -6

Doing the convolution graphically, we find that

$$\text{rect}(t/2) * \text{rect}((t-3)/2)$$

is a trapezoid whose base extends from $t = 1$ to $t = 5$ and whose maximum height is 2.

Therefore $y(t)$ has a maximum value of zero and a minimum value of -6.

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1. If $y(t) = \text{tri}(t/4) * 4\delta(t+1)$, what is the numerical value of $y(0)$?
 $y(0) = \underline{3}$

$$y(t) = \text{tri}(t/4) * 4\delta(t+1) = 4 \text{tri}((t+1)/4)$$

$$y(0) = 4 \text{tri}(1/4) = 4(1 - 1/4) = 3$$

2. If $y(t) = \text{rect}(t/6) * [2\delta(t) - \delta(t+2)]$, what is the numerical value of $y(-1)$?
 $y(-1) = \underline{1}$

$$y(t) = \text{rect}(t/6) * [2\delta(t) - \delta(t+2)] = 2\text{rect}(t/6) - \text{rect}((t+2)/6)$$

$$y(-1) = 2\text{rect}(-1/6) - \text{rect}((-1+2)/6) = 2\text{rect}(-1/6) - \text{rect}(1/6) = 2 - 1 = 1$$

3. If $y(t) = -2\text{rect}(t/2) * \text{rect}((t-3)/2)$, what are the numerical maximum and minimum values of y for all time? Maximum = 0, Minimum = -4

Doing the convolution graphically, we find that

$$\text{rect}(t/2) * \text{rect}((t-3)/2)$$

is a trapezoid whose base extends from $t = 1$ to $t = 5$ and whose maximum height is 2.

Therefore $y(t)$ has a maximum value of zero and a minimum value of -4.

Solution of ECE 315 Test 6 F06

1. If $y(t) = \text{tri}(t/16) * 7\delta(t+3)$, what is the numerical value of $y(0)$?
 $y(0) = \underline{5.6875}$

$$y(t) = \text{tri}(t/16) * 7\delta(t+3) = 7 \text{tri}((t+3)/16)$$

$$y(0) = 7 \text{tri}(3/16) = 7(1 - 3/16) = 91/16 = 5.6875$$

2. If $y(t) = \text{rect}(t/6) * [\delta(t) - 3\delta(t-2)]$, what is the numerical value of $y(2)$?
 $y(2) = \underline{-2}$

$$y(t) = \text{rect}(t/6) * [\delta(t) - 3\delta(t-2)] = \text{rect}(t/6) - 3\text{rect}((t-2)/6)$$

$$y(2) = \text{rect}(2/6) - 3\text{rect}((2-2)/6) = \text{rect}(1/3) - 3\text{rect}(0) = 1 - 3 = -2$$

3. If $y(t) = -3\text{rect}(t/2) * 2\text{rect}((t-3)/2)$, what are the numerical maximum and minimum values of y for all time? Maximum = 0, Minimum = -12

Doing the convolution graphically, we find that

$$\text{rect}(t/2) * \text{rect}((t-3)/2)$$

is a trapezoid whose base extends from $t = 1$ to $t = 5$ and whose maximum height is 2.

Therefore $y(t)$ has a maximum value of zero and a minimum value of -12.