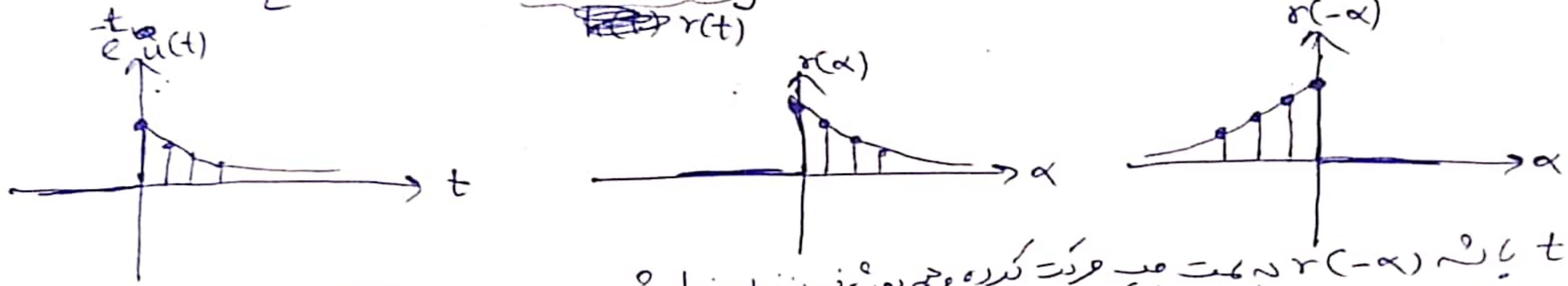
سوال ۱ - الف:

$$w(t) = x(t) * h_1(t) = e^{-t}u(t) * (\delta(t) - e^{-2t}u(t)) =$$

$$e^{-t}u(t) - [\underbrace{e^{-t}u(t) * e^{-2t}u(t)}_{y(t)}] =$$



اگر $t<0$ باشد $x(-\alpha)$ به سمت چپ حرکت کرده و هم پوشانی نخواهند داشت $\Leftarrow$ $y(t)=0$

اگر $t>0$ باشد از نقطه صفر تا t هم پوشانی وجود دارد و $y(t)$ مساوی است با:

$$y(t) = \int_0^t e^{-\alpha}u(\alpha)\, e^{-2(t-\alpha)}\, u(t-\alpha)\, d\alpha = \int_0^t e^{-\alpha}\, e^{-2t}\, e^{2\alpha}\, \cancel{u(\alpha)\, u(t-\alpha)}\, d\alpha$$

$$= \int_0^t e^{-2t} e^{\alpha}\, d\alpha = e^{-2t}\int_0^t e^{\alpha}\, d\alpha = e^{-2t}\left[e^{\alpha}\Big|_0^t\right] = e^{-2t}\left[e^{t} - 1\right] = e^{-t} - e^{-2t}$$

با توجه به اینکه در $t<0$ ، $y(t)=0$ است و در $t \geq 0$ و همچنین $t-\alpha \geq 0 \Leftarrow \alpha \leq t$ ، $y(t)$ مقدار دارد:

$$y(t) = \begin{cases} e^{-t} - e^{-2t} & t \geq 0 \\ 0 & t<0 \end{cases} \Rightarrow y(t) = (e^{-t} - e^{-2t})u(t) = e^{-t}u(t) - e^{-2t}u(t)$$

حال داریم:

$$w(t) = e^{-t}u(t) - \left[e^{-t}u(t) - e^{-2t}u(t)\right] = e^{-2t}u(t)$$

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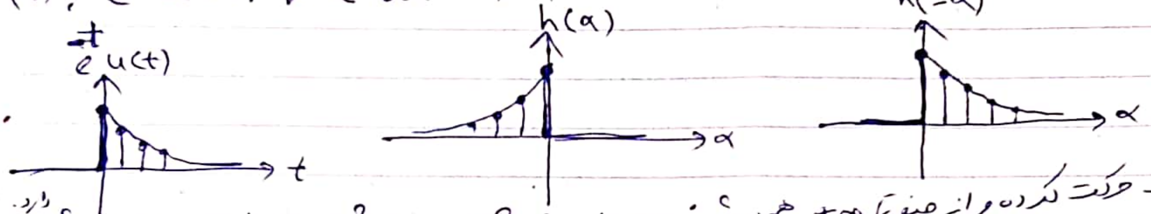
سوال ۱ - ب):

$$z(t) = e^{-t}u(t) * \left[\delta(t) - e^{t}u(-t)\right] = e^{-t}u(t) - \underbrace{\left[e^{-t}u(t) * e^{t}u(-t)\right]}_{(1)}$$

$$(1):\ e^{-t}u(t) * \overbrace{e^{t}u(-t)}^{h'(\alpha)}$$



اگر $t<0$ باشه به سمت چپ حرکت کرده و از صفر تا $+\infty$ هم پوشانی وجود دارد ولی اگر $t>0$ باشه از t تا $+\infty$ هم پوشانی وجود دارد.

$$\text{if } t>0 \Rightarrow y(t) = \int_{t}^{+\infty} e^{-\alpha}\, e^{t-\alpha}\, d\alpha = e^{t}\int_{t}^{+\infty} e^{-2\alpha}\, d\alpha = e^{t}\left[-\tfrac{1}{2}e^{-2\alpha}\Big|_{t}^{+\infty}\right]$$

$$= e^{t}\left[0 + \tfrac{1}{2}e^{-2t}\right] = \tfrac{1}{2}e^{-t}$$

$$\text{if } t<0 \Rightarrow y(t) = \int_{0}^{+\infty} e^{-\alpha}\, e^{t-\alpha}\, d\alpha = e^{t}\int_{0}^{+\infty} e^{-2\alpha}\, d\alpha = e^{t}\left[-\tfrac{1}{2}e^{-2\alpha}\Big|_{0}^{+\infty}\right] =$$

$$e^{t}\left[0 - \left(-\tfrac{1}{2}\right)\right] = \tfrac{1}{2}e^{t}$$

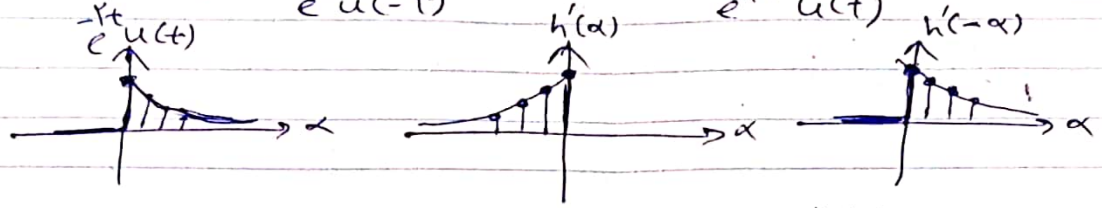
$$z(t) = \begin{cases} e^{-t} - \tfrac{1}{2}e^{-t} = \tfrac{1}{2}e^{-t} & t>0 \\ 0 - \tfrac{1}{2}e^{t} = -\tfrac{1}{2}e^{t} & t<0 \end{cases} \Rightarrow \boxed{z(t) = \tfrac{1}{2}e^{-t}u(t) - \tfrac{1}{2}e^{t}u(-t)}$$

سوال ۱ - ج) :

$$h(t) = h_1(t) * h_2(t) = \left(\delta(t) - e^{-2t}u(t)\right) * \left(\delta(t) - e^{t}u(-t)\right) =$$

$$\cancel{\delta(t) * \delta(t)}^{\,\delta(t)} - \underbrace{\cancel{\left(\delta(t) * e^{t}u(-t)\right)}}_{e^{t}u(-t)} - \underbrace{\cancel{\left(\delta(t) * e^{-2t}u(t)\right)}}_{e^{-2t}u(t)} + \underbrace{\left(e^{-2t}u(t) * \overset{h'(\alpha)}{e^{t}u(-t)}\right)}_{(1)\; = y(t)}$$

(1) :



$$\text{if } t<0 \Rightarrow y(t) = \int_0^{+\infty} e^{-2\alpha} e^{t-\alpha} d\alpha = e^{t}\int_0^{+\infty} e^{-3\alpha} d\alpha = e^{t}\left[-\tfrac{1}{3} e^{-3\alpha}\Big|_0^{+\infty}\right]$$

$$e^{t}\left[0 + \tfrac{1}{3}\right] = \tfrac{1}{3} e^{t}$$

$$\text{if } t>0 \Rightarrow y(t) = \int_t^{+\infty} e^{-2\alpha} e^{t-\alpha} d\alpha = e^{t}\left[-\tfrac{1}{3} e^{-3\alpha}\Big|_t^{+\infty}\right] = e^{t}\left[0 + \tfrac{1}{3} e^{-3t}\right]$$

$$= \tfrac{1}{3} e^{-2t}$$

$$\Rightarrow h(t) = \delta(t) - e^{t}u(-t) - e^{-2t}u(t) + \begin{cases} \tfrac{1}{3} e^{t} & t<0 \\ \tfrac{1}{3} e^{-2t} & t>0 \end{cases} =$$

$$\text{if } t<0 \Rightarrow \tfrac{1}{3} e^{t} - e^{t} = -\tfrac{2}{3} e^{t}, \quad \text{if } t>0 \Rightarrow \tfrac{1}{3} e^{-2t} - e^{-2t} = -\tfrac{2}{3} e^{-2t}$$

$$\Rightarrow h(t) = \boxed{\delta(t) - \tfrac{2}{3} e^{t}u(-t) - \tfrac{2}{3} e^{-2t}u(t)}$$

سوال ۱ - د) :

$$y_1(t) = w(t) * h_2(t) = e^{-2t}u(t) * \left[\delta(t) - e^{t}u(-t)\right] =$$

$$e^{-2t}u(t) - \left[e^{-2t}u(t) * e^{t}u(-t)\right] = e^{-2t}u(t) - \tfrac{1}{3} e^{t}u(-t) - \tfrac{1}{3} e^{-2t}u(t)$$

در قسمت ج محاسبه شد برابر است با :

$$\tfrac{1}{3} e^{t}u(-t) + \tfrac{1}{3} e^{-2t}u(t)$$

$$= \boxed{\tfrac{2}{3} e^{-2t}u(t) - \tfrac{1}{3} e^{t}u(-t)}$$

سوال ۱ - هـ :

$$y_2(t) = z(t) * h_1(t) = \left[\tfrac{1}{2} e^{-t} u(t) - \tfrac{1}{2} e^{t} u(-t)\right] * \left[\delta(t) - e^{-2t} u(t)\right] =$$

$$\overset{\frac{1}{2} e^{-t} u(t)}{\left(\tfrac{1}{2} e^{-t} u(t) * \delta(t)\right)} - \underbrace{\left(\tfrac{1}{2} e^{-t} u(t) * e^{-2t} u(t)\right)}_{(1)} - \overset{\frac{1}{2} e^{t} u(-t)}{\left(\tfrac{1}{2} e^{t} u(-t) * \delta(t)\right)}$$

$$+ \underbrace{\left(\tfrac{1}{2} e^{t} u(-t) * e^{-2t} u(t)\right)}_{(2)} =$$

(۱) : در قسمت الف محاسبه شده بود از قبل که برابر است با :

$$\tfrac{1}{2}\left[e^{-t} u(t) - e^{-2t} u(t)\right] = \tfrac{1}{2} e^{-t} u(t) - \tfrac{1}{2} e^{-2t} u(t)$$

(۲) : در قسمت ج محاسبه شده بود از قبل که برابر است با :

$$\tfrac{1}{2}\left[\tfrac{1}{3} e^{t} u(-t) + \tfrac{1}{3} e^{-2t} u(t)\right] = \tfrac{1}{6} e^{t} u(-t) + \tfrac{1}{6} e^{-2t} u(t)$$

$$y_2(t) = \cancel{\tfrac{1}{2} e^{-t} u(t)} - \cancel{\tfrac{1}{2} e^{-t} u(t)} + \tfrac{1}{2} e^{-2t} u(t) - \boxed{\tfrac{1}{2} e^{t} u(-t)}$$

$$+ \boxed{\tfrac{1}{6} e^{t} u(-t)} + \tfrac{1}{6} e^{-2t} u(t) = \boxed{\tfrac{2}{3} e^{-2t} u(t) - \tfrac{1}{3} e^{t} u(-t)}$$

سوال ۱ - و :

$$y_3(t) = e^{-t} u(t) * \left[\delta(t) - \tfrac{2}{3} e^{t} u(-t) - \tfrac{2}{3} e^{-2t} u(t)\right] =$$

$$e^{-t} u(t) - \underbrace{\left(\tfrac{2}{3} e^{-t} u(t) * e^{t} u(-t)\right)}_{(1)} - \underbrace{\left(\tfrac{2}{3} e^{-t} u(t) * e^{-2t} u(t)\right)}_{(2)} =$$

(۱) : در قسمت ب محاسبه شده بود :

$$\tfrac{2}{3}\left[\tfrac{1}{2} e^{-t} u(t) + \tfrac{1}{2} e^{t} u(-t)\right] = \tfrac{1}{3} e^{-t} u(t) + \tfrac{1}{3} e^{t} u(-t)$$

(۲) : در قسمت الف محاسبه شده بود :

$$\tfrac{2}{3}\left[e^{-t} u(t) - e^{-2t} u(t)\right] = \tfrac{2}{3} e^{-t} u(t) - \tfrac{2}{3} e^{-2t} u(t)$$

$$y_3(t) = e^{-t} u(t) - \tfrac{1}{3} e^{-t} u(t) - \tfrac{1}{3} e^{t} u(-t) - \tfrac{2}{3} e^{-t} u(t) + \tfrac{2}{3} e^{-2t} u(t) =$$

$$\boxed{\tfrac{2}{3} e^{-2t} u(t) - \tfrac{1}{3} e^{t} u(-t)}$$

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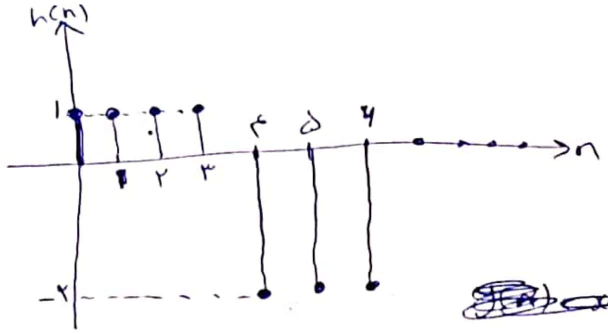
درستی تساوی ها: به مشاهده می‌شود که این تساوی ها برقرار هستند. با توجه به خاصیت شرکت‌پذیری و جابه‌جایی کانولوشن می‌توان تساوی را اثبات کرد

با توجه به خاصیت شرکت‌پذیری برقرار است.

$$((x(t) * h_1(t)) * h_2(t) = x(t) * (h_1(t) * h_2(t))$$

$$x(t) * (h_1(t) * h_2(t)) \xlongequal{\text{خاصیت جابه‌جایی}} x(t) * (h_2(t) * h_1(t)) \xlongequal{\text{شرکت‌پذیری}} (x(t) * h_2(t)) * h_1(t)$$

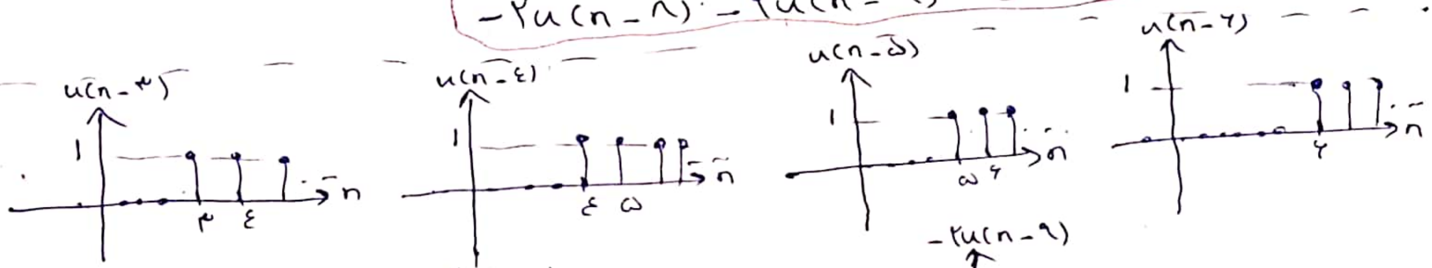
سوال ۲ _ الف):

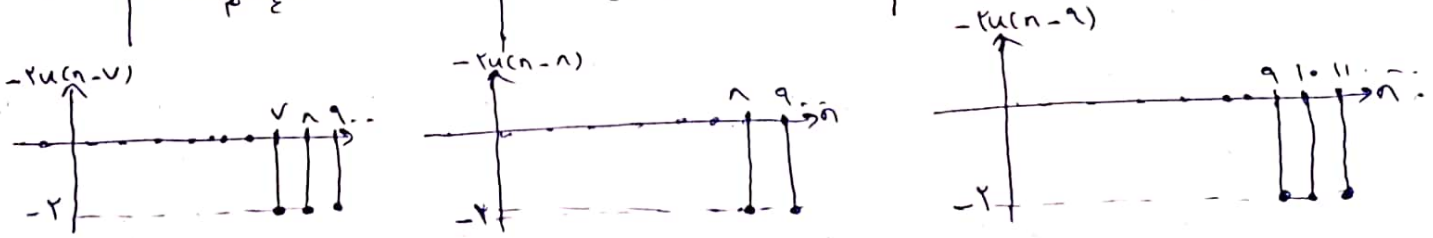


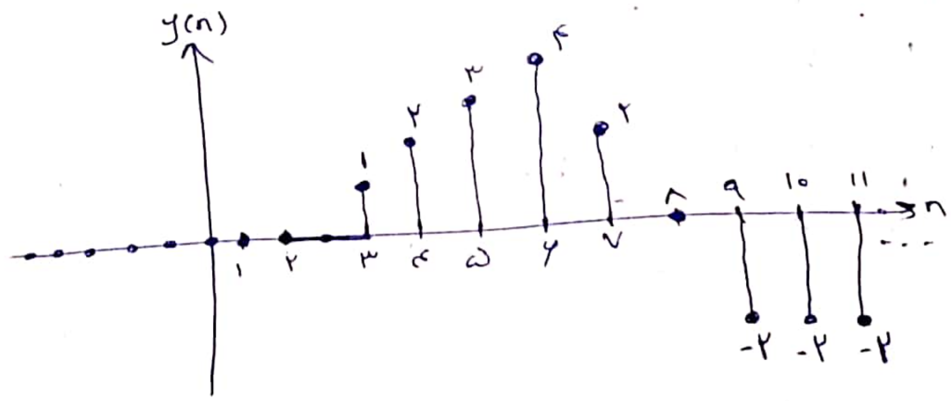
$$h(n) = \delta(n) + \delta(n-1) + \delta(n-2) + \delta(n-3) - 2\delta(n-4) - 2\delta(n-5) - 2\delta(n-6)$$

$$y(n) = x(n) * h(n) = x(n) * \left[\delta(n) + \delta(n-1) + \delta(n-2) + \delta(n-3) - 2\delta(n-4) - 2\delta(n-5) - 2\delta(n-6) \right] = x(n) + x(n-1) + x(n-2) + x(n-3) - 2x(n-4) - 2x(n-5) - 2x(n-6)$$

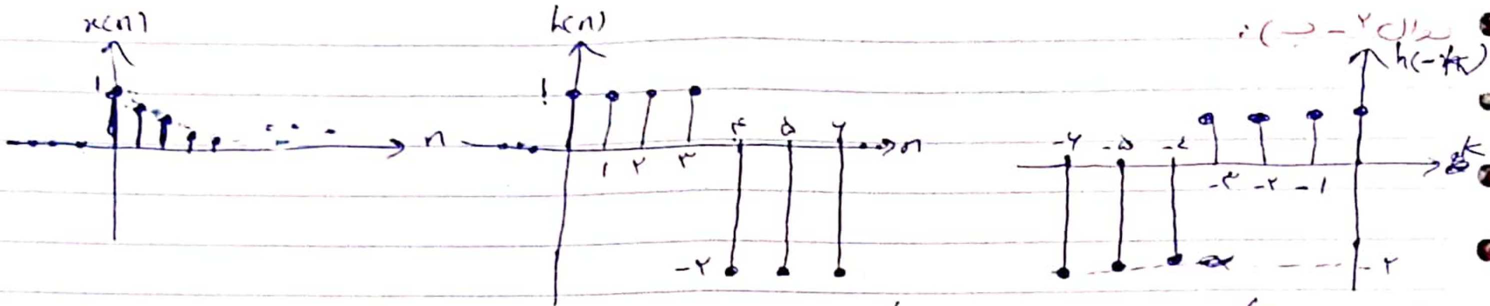
$$= u(n-3) + u(n-4) + u(n-5) + u(n-6) - 2u(n-7) - 2u(n-8) - 2u(n-9) = y(n)$$







سوال ۲ - ب) :



اگر $n<0$ باشد که $h(n-k)$ به سمت چپ حرکت کرده و هیچ هم‌پوشانی با $x(k)$ نخواهد داشت. اما برای n های مثبت سه محدوده متفاوت می‌توان داشت :

$$\text{if } 0\le n\le 3 \Rightarrow y(n)=\sum_{k=0}^{n} a^{-k}=\sum_{k=0}^{n}\left(\tfrac{1}{a}\right)^{k}=\boxed{\frac{1-\left(\tfrac{1}{a}\right)^{n+1}}{1-\tfrac{1}{a}}}$$

$$\text{if } 3<n\le 6 \Rightarrow y(n)=-2\underbrace{\sum_{k=0}^{n-4}\left(\tfrac{1}{a}\right)^{k}}_{(1)}+\underbrace{\sum_{k=n-3}^{n}\left(\tfrac{1}{a}\right)^{k}}_{(2)} \overset{*}{=}$$

$$(1)\ \sum_{k=0}^{n-4}\left(\tfrac{1}{a}\right)^{k}=\frac{1-\left(\tfrac{1}{a}\right)^{n-3}}{1-\tfrac{1}{a}} \qquad (2)\ \boxed{r=k-n+3} \qquad (2)\overset{*}{=}\sum_{r=0}^{3}\left(\tfrac{1}{a}\right)^{r}=\frac{1-\left(\tfrac{1}{a}\right)^{4}}{1-\tfrac{1}{a}}$$

$$\overset{*}{=}\boxed{(-2)\left(\frac{1-\left(\tfrac{1}{a}\right)^{n-3}}{1-\tfrac{1}{a}}\right)+\frac{1-\left(\tfrac{1}{a}\right)^{4}}{1-\tfrac{1}{a}}}$$

$$\text{if } n>6 \Rightarrow y(n)=-2\underbrace{\sum_{k=n-6}^{n-4}\left(\tfrac{1}{a}\right)^{k}}_{(1)}+\underbrace{\sum_{k=n-3}^{n}\left(\tfrac{1}{a}\right)^{k}}_{(2)}=-2\left(\frac{1-\left(\tfrac{1}{a}\right)^{3}}{1-\tfrac{1}{a}}\right)+\frac{1-\left(\tfrac{1}{a}\right)^{4}}{1-\tfrac{1}{a}}$$

$$(1):\ \boxed{r=k-n+6} \quad =-2\sum_{r=0}^{2}\left(\tfrac{1}{a}\right)^{r}=-2\left[\frac{1-\left(\tfrac{1}{a}\right)^{3}}{1-\tfrac{1}{a}}\right]$$

$$(2)\ r_1=k-n+3 \quad =\sum_{r_1=0}^{3}\left(\tfrac{1}{a}\right)^{r_1}=\frac{1-\left(\tfrac{1}{a}\right)^{4}}{1-\tfrac{1}{a}}$$

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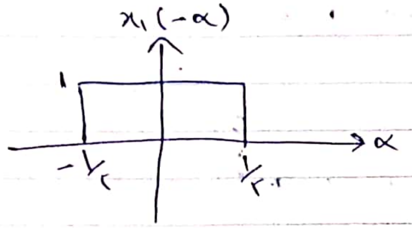
ادامه سوال ۲ ـ ب) :

$$y(n) = \begin{cases} 0 & n < 0 \\ \dfrac{1-\left(\frac{1}{a}\right)^{n+1}}{1-\frac{1}{a}} & 0 \leq n \leq 3 \\ -2\left[\dfrac{1-\left(\frac{1}{a}\right)^{n-3}}{1-\frac{1}{a}}\right] + \dfrac{1-\left(\frac{1}{a}\right)^{4}}{1-\frac{1}{a}} & 3 < n \leq 6 \\ -2\left[\dfrac{1-\left(\frac{1}{a}\right)^{3}}{1-\frac{1}{a}}\right] + \dfrac{1-\left(\frac{1}{a}\right)^{4}}{1-\frac{1}{a}} & n > 6 \end{cases}$$

سوال ۳ - الف):

$$x_2(t) = x_1(t) * x_1(t) = \int_{-\infty}^{+\infty} x_1(\alpha)\, x_1(t-\alpha)\, d\alpha =$$



اگر $t<-1$ باشد هیچ هم پوشانی نخواهد داشت $\Rightarrow x_2(t) = 0$

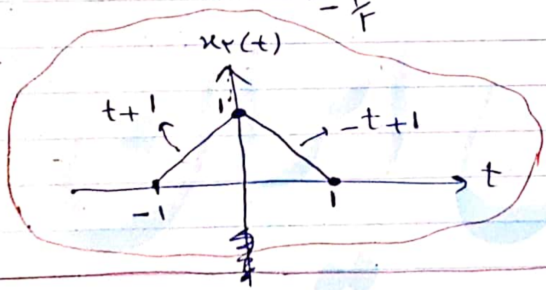
اگر $t>1$ باشد $x_1(-\alpha)$ به سمت راست حرکت کرده و هم پوشانی ندارند $\Rightarrow x_2(t) = 0$

$$\text{if } 0<t<1 \longrightarrow x_2(t) = \int_{-\frac{1}{2}+t}^{\frac{1}{2}} x_1(\alpha)\, x_1(t-\alpha)\, d\alpha = \int_{-\frac{1}{2}+t}^{\frac{1}{2}} 1\times 1\, d\alpha = \alpha \Big]_{-\frac{1}{2}+t}^{\frac{1}{2}} =$$

$$\frac{1}{2} - \left(-\frac{1}{2}+t\right) = \frac{1}{2}+\frac{1}{2}-t = -t+1$$

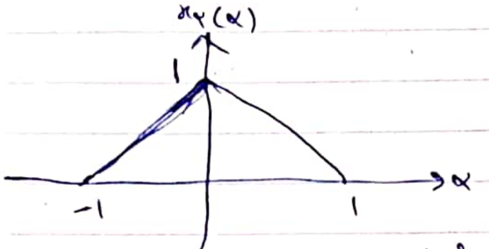
$$\text{if } -1<t<0 \Rightarrow x_2(t) = \int_{-\frac{1}{2}}^{\frac{1}{2}+t} x_1(\alpha)\, x_1(t-\alpha)\, d\alpha = \int_{-\frac{1}{2}}^{\frac{1}{2}+t} 1\times 1\, d\alpha = \alpha \Big]_{-\frac{1}{2}}^{\frac{1}{2}+t} =$$

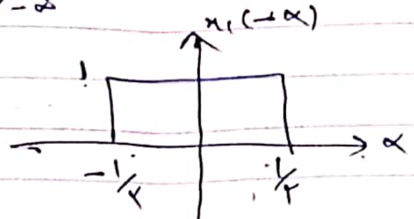
$$\frac{1}{2}+t - \left(-\frac{1}{2}\right) = \frac{1}{2}+t+\frac{1}{2} = t+1$$



ادامه سوال ۳ - الف):

$$x_3(t) = x_2(t) * x_1(t) = \int_{-\infty}^{+\infty} x_2(\alpha)\, x_1(t-\alpha)\, d\alpha$$





اگر $t>1,5$ باشه $x_1(-\alpha)$ به اندازه t به سمت راست حرکت میکنه که دیگه هم پوشانی با $x_2(t)$ نخواهد داشت $\Leftarrow y(t)=0$

〃 $t<-1,5$ 〃 〃 〃 〃 چپ 〃 〃 〃 〃 〃 〃 $\Leftarrow y(t)=0$

$$\text{if } -\tfrac{1}{2}<t<\tfrac{1}{2} \Rightarrow y(t) = \underbrace{\int_{0}^{\frac{1}{2}+t} 1\times(-\alpha+1)\,d\alpha}_{(1)} + \underbrace{\int_{-\frac{1}{2}+t}^{0} 1\times(\alpha+1)\,d\alpha}_{(2)} =$$

$$(1): = \int_0^{\frac{1}{2}+t} -\alpha\, d\alpha + \int_0^{\frac{1}{2}+t} 1\, d\alpha = -\frac{\alpha^2}{2}\Big]_0^{\frac{1}{2}+t} + \alpha\Big]_0^{\frac{1}{2}+t} = -\frac{(\frac{1}{2}+t)^2}{2} - 0 + \frac{1}{2}+t$$

$$= \frac{-(t^2+t+\frac{1}{4})}{2} + \frac{1}{2} + t = -\frac{t^2}{2} - \frac{t}{2} - \frac{1}{8} + \frac{1}{2} + t = \boxed{-\frac{t^2}{2} + \frac{t}{2} + \frac{3}{8}}$$

$$(2): = \int_{-\frac{1}{2}+t}^{0} (\alpha+1)\,d\alpha = \int_{-\frac{1}{2}+t}^{0} \alpha\, d\alpha + \int_{-\frac{1}{2}+t}^{0} 1\, d\alpha = \frac{\alpha^2}{2}\Big]_{-\frac{1}{2}+t}^{0} + \alpha\Big]_{-\frac{1}{2}+t}^{0} =$$

$$0 - \left(\frac{(t-\frac{1}{2})^2}{2}\right) + 0 + \frac{1}{2} - t = \frac{-(t^2-t+\frac{1}{4})}{2} + \frac{1}{2} - t = \boxed{-\frac{t^2}{2} + \frac{t}{2} - \frac{1}{8} + \frac{1}{2} - t}$$

$$= -\frac{t^2}{2} - \frac{t}{2} + \frac{3}{8}$$

$$\Rightarrow y(t) = -\frac{t^2}{2} \cancel{+\frac{t}{2}} + \frac{3}{8} - \frac{t^2}{2} \cancel{-\frac{t}{2}} + \frac{3}{8} = \boxed{-t^2 + \frac{6}{8}}$$

ادامه سوال ۳ _ الف):

$$\text{if } \tfrac{1}{2} < t < 1.5 \rightarrow y(t) = \int_{t-\frac{1}{2}}^{1} 1\times(-\alpha+1)\,d\alpha = \int_{t-\frac{1}{2}}^{1} -\alpha\,d\alpha + \int_{t-\frac{1}{2}}^{1} 1\,d\alpha =$$

$$-\frac{\alpha^2}{2}\Big]_{t-\frac{1}{2}}^{1} + \alpha\Big]_{t-\frac{1}{2}}^{1} = -\frac{1}{2} - \left[-\frac{(t-\frac{1}{2})^2}{2}\right] + 1 - t + \frac{1}{2} =$$

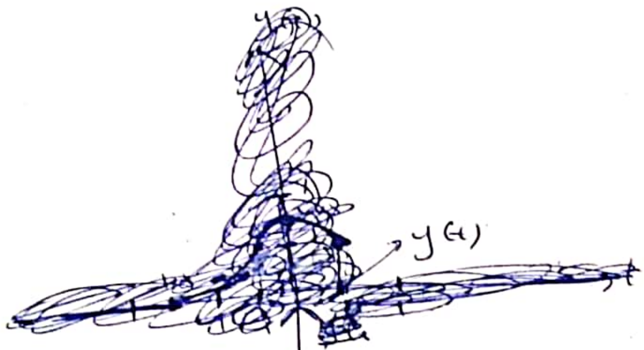
$$\cancel{-\frac{1}{2}} + \frac{t^2 - t + \frac{1}{4}}{2} + 1 - t + \cancel{\frac{1}{2}} = \frac{t^2}{2} - \frac{t}{2} + \frac{1}{8} + 1 - t = \boxed{\frac{t^2}{2} - \frac{3}{2}t + \frac{9}{8}}$$

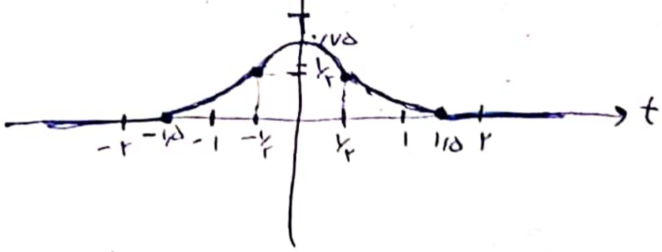
$$\text{if } -1.5 < t < -\tfrac{1}{2} \Rightarrow y(t) = \int_{-1}^{t+\frac{1}{2}} (\alpha+1)\,d\alpha = \int_{-1}^{t+\frac{1}{2}} \alpha\,d\alpha + \int_{-1}^{t+\frac{1}{2}} 1\,d\alpha =$$

$$\frac{\alpha^2}{2}\Big]_{-1}^{t+\frac{1}{2}} + \alpha\Big]_{-1}^{t+\frac{1}{2}} = \frac{(t+\frac{1}{2})^2}{2} \cancel{-\frac{1}{2}} + t + \cancel{\frac{1}{2}} + 1 = \frac{t^2}{2} + \frac{t}{2} + \frac{1}{8} + t + 1$$

$$= \boxed{\frac{t^2}{2} + \frac{3}{2}t + \frac{9}{8}}$$

$$y(t) = \begin{cases} 0 & t > 1.5 \\ \frac{t^2}{2} - \frac{3}{2}t + \frac{9}{8} & \frac{1}{2} < t < 1.5 \\ -t^2 + \frac{6}{8} & -\frac{1}{2} < t < \frac{1}{2} \\ \frac{t^2}{2} + \frac{3}{2}t + \frac{9}{8} & -1.5 < t < -\frac{1}{2} \\ 0 & t < -1.5 \end{cases}$$

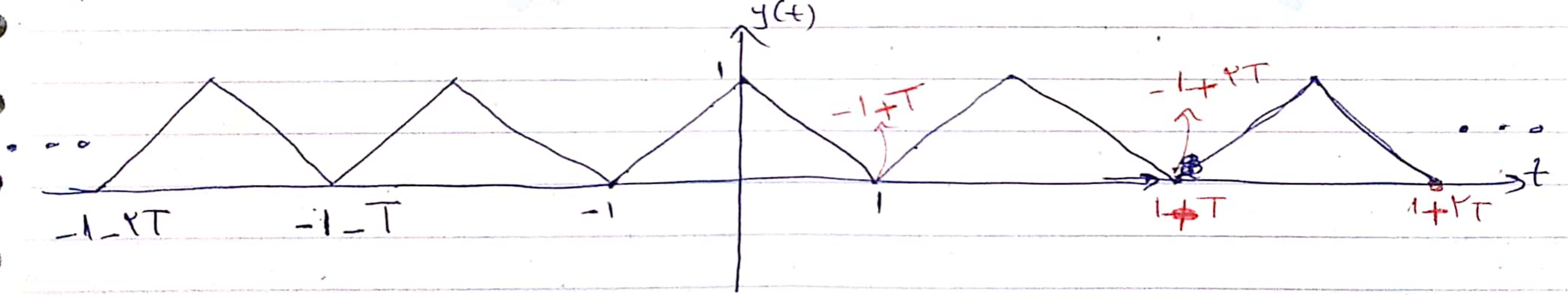




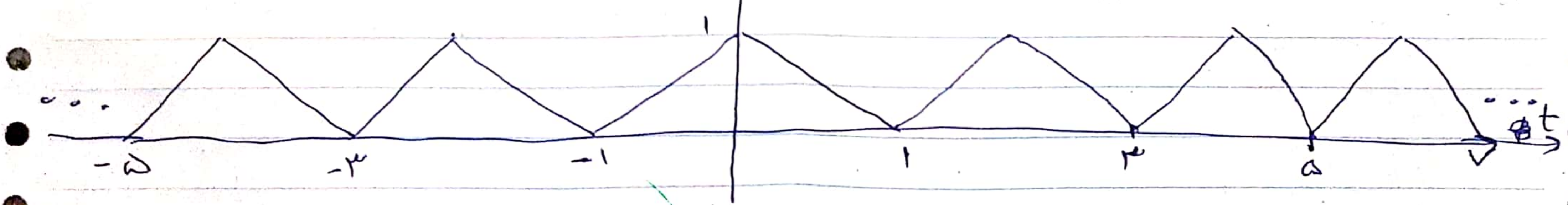
سوال ۳ ـ ب) :

$$h(t) = \dots + \delta(t+4T) + \delta(t+3T) + \delta(t+2T) + \delta(t+T) + \delta(t) + \delta(t-T)$$
$$+ \delta(t-2T) + \delta(t-3T) + \delta(t-4T) + \dots$$

$$y(t) = x_2(t) * h(t) = x_2(t) * \left[\dots + \delta(t-T) + \delta(t) + \delta(t+T) + \dots\right] =$$
$$= \dots + x_2(t-T) + x_2(t) + x_2(t+T) + x_2(t+2T) + \dots$$

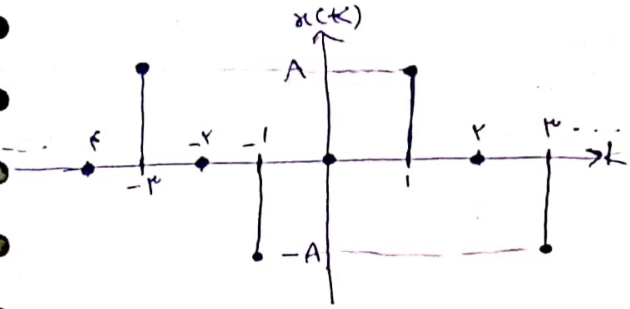


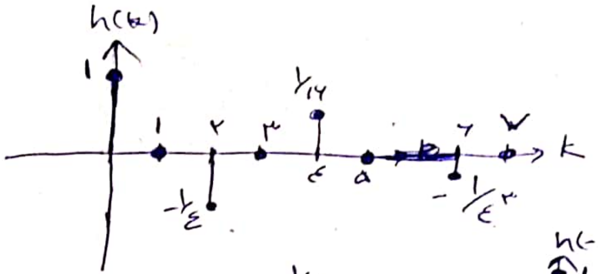
برای شکل اگر T = ۲ باشد داریم:

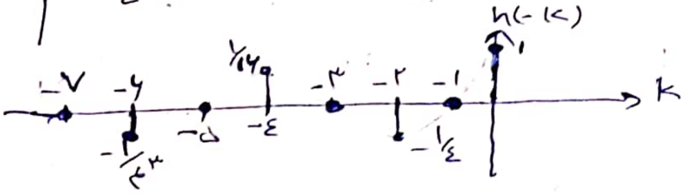


CamScanner

سوال ۴:

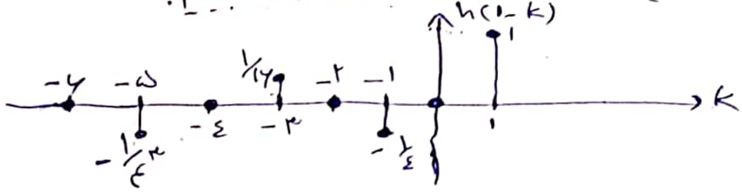






$$y(n)=\sum_{k=-\infty}^{+\infty} x(k)\,h(n-k) \Longrightarrow y(1)=\sum_{k=-\infty}^{+\infty} x(k)\,\underbrace{h(1-k)}_{}$$

یعنی ۱ واحد h(-k) را به سمت راست ببریم.



$$y(1)=\sum_{k=-\infty}^{+\infty} x(k)\,h(1-k) = A\times 1+\left(-\tfrac{1}{4}\right)(-A)+A\left(\tfrac{1}{16}\right)+(-A)\left(-\tfrac{1}{4^3}\right)+\cdots =$$

$$A+\frac{A}{4}+\frac{A}{16}+\frac{A}{4^3}+\cdots = A\underbrace{\left[1+\frac{1}{4}+\frac{1}{4^2}+\frac{1}{4^3}+\cdots\right]}_{\text{سری هندسی با قدر نسبت } \frac{1}{4}\ (1)} = -4$$

$$(1)=\sum_{k=0}^{\infty}\left(\frac{1}{4}\right)^k=\frac{1}{1-\frac{1}{4}}=\frac{1}{\frac{3}{4}}=\frac{4}{3}$$

$$\frac{4}{3}A=-4 \Longrightarrow \boxed{A=-3}$$