2.21.(c) 解：当 $n \le 6$ 时，

$$y[n] = 4^n\left\{\sum_{k=0}^{\infty}\left(-\frac{1}{8}\right)^k - \sum_{k=0}^{3}\left(-\frac{1}{8}\right)^k\right\}$$

当 $n > 6$ 时，

$$y[n] = 4^n\left\{\sum_{k=0}^{\infty}\left(-\frac{1}{8}\right)^k - \sum_{k=0}^{n-1}\left(-\frac{1}{8}\right)^k\right\}$$

$$\therefore y[n] = \begin{cases} \frac{8}{9}\left(-\frac{1}{8}\right)^4 4^n, & n \le 6 \\ \frac{8}{9}\left(-\frac{1}{2}\right)^n, & n > 6 \end{cases}$$

2.22(a) 解：

由已知，得

$$y(t) = \int_{-\infty}^{\infty} x(t)h(t-\tau)d\tau$$

$$= \int_0^t e^{-\alpha t} e^{-\beta(t-\tau)} d\tau, \quad t \geqslant 0$$

$$\therefore y(t) = \begin{cases} \dfrac{e^{-\beta t}\left(e^{-(\alpha-\beta)t}-1\right)}{\beta-\alpha} & \alpha \ne \beta \\ t e^{-\beta t} u(t) & \alpha = \beta \end{cases}$$

2.24 解：(a) $\because h_2[n] = \delta[n] + \delta[n-1]$

$\therefore h_2[n] * h_2[n] = \delta[n] + 2\delta[n-1] + \delta[n-2]$

又 $h[n] = h_1[n] * [h_2[n] * h_2[n]]$

$\therefore h[n] = h_1[n] + 2h_1[n-1] + h_1[n-2]$

$\therefore h[0] = h_1[0] = 1 \quad h[1] = h_1[1] + 2h_1[0] = 3 \Rightarrow h_1[1] = 3$

$h[2] = h_1[2] + 2h_1[1] + h_1[0] \Rightarrow h_1[2] = 3$

$h[3] = h_1[3] + 2h_1[2] + h_1[1] \Rightarrow h_1[3] = 2$

$h[4] = h_1[4] + 2h_1[3] + h_1[2] \Rightarrow h_1[4] = 1$

$h[5] = h_1[5] + 2h_1[4] + h_1[3] \Rightarrow h_1[5] = 0$

当 $n<0$ 或 $n>5$ 时，$h_1[n]=0$，此即 $h_1[n]$ 表达式

(b) 由已知，得

$$y[n] = x[n] * h[n] = h[n] - h[n-1]$$

2.29(d) 解：不是因果的，$\because t<0$ 时，$h(t) \ne 0$

是稳定的，$\because \int_{-\infty}^{\infty} |h(t)| dt = \frac{e^{-2}}{2} < \infty$

2.32. 解. (a) ∵ $A(\frac{1}{2})^n - \frac{1}{2}A(\frac{1}{2})^{n-1} = 0$

∴ 齐次解 $y_h[n]$ 为 $y_h[n] = A(\frac{1}{2})^n$

(b) 由已知有: $n>0$ 时

$$B(\frac{1}{3})^n - \frac{1}{2}B(\frac{1}{3})^{n-1} = (\frac{1}{3})^n$$

得 $B=-2$

(c) 由P(2.32-1), 得

$$y[0] = x[0] + \frac{1}{2}y[-1] = x[0] = 1$$

∴ $y[0] = A+B \Rightarrow A = 1-B = 3$

2.33 (a) (i) 解: 设 $y_p(t) = Ye^{3t}$ $\quad y(t) = y_p(t) + y_h(t)$

则 $3Ye^{3t} + 2Ye^{3t} = e^{3t}$

$\Rightarrow 5Y = 1 \Rightarrow Y = \frac{1}{5}$ $\quad$ ∴ $y_p(t) = \frac{1}{5}e^{3t}$, $t>0$

设 $y_h(t) = Ae^{st}$, 则

$$Ase^{st} + 2Ae^{st} = Ae^{st}(s+2) = 0$$

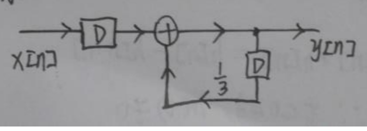
$\Rightarrow s = -2$ $\quad$ ~~将y(0)=0~~

∴ $y(t) = Ae^{-2t} + \frac{1}{5}e^{3t}$, $t>0$

将 $y(0)=0$ 代入, 得 $A = -\frac{1}{5}$

∴ $y(t) = [\frac{1}{5}e^{3t} - \frac{1}{5}e^{-2t}]$, $t>0$

2.38 (b) 解: 如图所示



2.39 (b) 解: 如图所示,