A 4.11

(a) $H(z) = b_1 + b_2 z^{-2} = \dfrac{b_1 z^2 + b_2}{z^2} = b_1 \cdot \dfrac{z^2 + \frac{b_2}{b_1}}{z^2} = b_1 \cdot \dfrac{\left(z - j\sqrt{\frac{b_2}{b_1}}\right)\left(z + j\sqrt{\frac{b_2}{b_1}}\right)}{z^2}$

$$\left.\begin{array}{l} |H(1)| = H_0 \\ H(j) = 1 \end{array}\right\} \quad \begin{array}{l} |b_1 + b_2| = H_0 \\ b_1 - b_2 = 1 \end{array}$$

$|1 + 2b_2| = H_0$

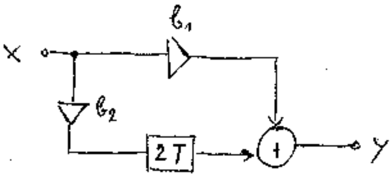
$1 + 2b_2 = \pm H_0 \qquad (b_2 \in \mathbb{R})$

$b_2 = \dfrac{-1 \pm H_0}{2}$

$b_1 = \dfrac{1 \pm H_0}{2}$

(b) (i) $h[n] = b_1\, \delta[n] + b_2\, \delta[n-2]$

$y[n] = b_1\, x[n] + b_2\, x[n-2]$



$\Rightarrow$ nichtrekursiv

(ii) $H(e^{j\Theta}) = b_1 + b_2 \cdot e^{-j2\Theta} = e^{-j\Theta} \cdot \left[b_1 e^{j\Theta} + b_2 e^{-j\Theta}\right]$

$$\operatorname{arc}\left\{H(e^{j\Theta})\right\} = -\Theta + \underbrace{\operatorname{arc}\left\{b_1 e^{j\Theta} + b_2 e^{-j\Theta}\right\}}_{\text{konst. od. } k_1 \cdot \Theta}$$

$b_1 = 0: \quad \operatorname{arc}\left\{H(e^{j\Theta})\right\} = -2\Theta$

$b_2 = 0: \quad \operatorname{arc}\left\{H(e^{j\Theta})\right\} = 0$

$b_1 = b_2 = 0: \quad \operatorname{arc}\left\{H(e^{j\Theta})\right\} = -\Theta$

(iii) siehe (c)

(c)