Svar på lektionsuppgifterna – TSDT18/84 Signaler & System

Lektion 6

4.3-2 **(a)** $y_{zi}(t)=0 \Rightarrow y(t)=y_{zs}(t)=\left(e^{-t}-e^{-2t}\right)u(t)$

(b) $y(t)=y_{zi}(t)+y_{zs}(t)$ där $y_{zi}(t)=(2+5t)e^{-2t}u(t)$ och $y_{zs}(t)=t\cdot e^{-2t}u(t)$

4.3-5 **(b)** $H(s)=\dfrac{3s^2+7s+5}{s^3+6s^2-11s+6}$ **(c)** $H(s)=\dfrac{3s+2}{s\left(s^3+4\right)}$

4.3-6 **(a)** $\dfrac{d^2y(t)}{dt^2}+3\dfrac{dy(t)}{dt}+8y(t)=\dfrac{dx(t)}{dt}+5x(t)$

(b) $\dfrac{d^3y(t)}{dt^3}+8\dfrac{d^2y(t)}{dt^2}+5\dfrac{dy(t)}{dt}+7y(t)=\dfrac{d^2x(t)}{dt^2}+3\dfrac{dx(t)}{dt}+5x(t)$

4.3-7(a) **(i)** $y_{zs}(t)=\left(6-e^{-t}\left(6\cos(2t)-7\sin(2t)\right)\right)u(t)$

(ii) $y_{zs}(t)=\dfrac{1}{10}y_{\text{zs,uppg(i)}}(t-5)=\dfrac{1}{10}\left(6-e^{-(t-5)}\left(6\cos\left(2(t-5)\right)-7\sin\left(2(t-5)\right)\right)\right)u(t-5)$

4.3-8 **(a)** $y_{zs}(t)=\dfrac{1}{10}\left(e^{-t}-\cos(3t)+\dfrac{1}{3}\sin(3t)\right)u(t)$

4.3-12 **(a)** **(i)** Stabilt system **(ii)** Instabilt system
(iii) Marginellt stabilt system **(iv)** Marginellt stabilt system
(v) Instabilt system

(b) **(i)** Stabilt system **(ii)** Stabilt system
(iii) Stabilt system **(iv)** Instabilt system

4.4-1 $y_{zs}(t)=e^{-t}\left(t-\sin(t)\right)u(t)$

4.5-1 **(a)** Nej, $H(s)\neq\dfrac{1}{4}$ – det efterföljande systemet i kaskadkopplingen belastar det första systemet $\Rightarrow H(s)=\dfrac{1}{6}$

(b) $H(s)=\dfrac{1}{4}$

4.5-3 **(a)** $H(s)=\dfrac{1}{s+1}$, $\text{Re}\{s\}>-1$, dvs. systemet är stabilt.

(b) K=1: Stabilt system, K=−3: Instabilt system,
K=2: Stabilt system, K=0: $y(t)=0$ för alla $x(t)$