

Fasit TMA 4110/15 9. aug 2012

Oppg 1 i) $1, \frac{1}{2}(-1+i\sqrt{3}), \frac{1}{2}(-1-i\sqrt{3})$

ii) $\frac{1}{\sqrt{2}}(1+i), \frac{1}{2\sqrt{2}}(-1-\sqrt{3}+i(\sqrt{3}-1))$

$$\frac{1}{2\sqrt{2}}(-1+\sqrt{3}-i(\sqrt{3}+1))$$

Oppg 2 $y(x) = e^x(1-x+x \ln x)$

Oppg 3 Overdamped for $c > 2$
Kritisk dampet for $c = 2$
Underdampet for $0 < c < 2$

$$y_s(t) = \frac{1}{13}(3 \cos t + 2 \sin t)$$

Oppg 4 Her er det mange riktige svar, f.eks

$$\left\{ \frac{1}{\sqrt{2}} \begin{bmatrix} -1 \\ 1 \\ 0 \\ 0 \end{bmatrix}, \frac{1}{3\sqrt{2}} \begin{bmatrix} 1 \\ 1 \\ 4 \\ 0 \end{bmatrix}, \frac{1}{3\sqrt{10}} \begin{bmatrix} -2 \\ -2 \\ 1 \\ 9 \end{bmatrix} \right\}$$

Oppg 5

$t = 1$ ingen løsninger
 $t = -1$ uendelig mange løsninger
 $t \neq \pm 1$ nøyaktig én løsning.

Oppg 6

$$a > 0.$$

Oppg 7

$$x_1(t) = 50(e^{-t/50} + 1)$$

$$x_2(t) = 50(-e^{-t/50} + 1)$$

$$x_2(t) = 25 \text{ for } t = 50 \ln 2.$$