Tentamen juni 2008

Opgave 1

a

```
A = {{-2, -5 / 2}, {10, -2}}
```

$$\left\{\left\{-2, -\frac{5}{2}\right\}, \{10, -2\}\right\}$$

```
Eigensystem[A]
```

$$\left\{\{-2 + 5\,i, -2 - 5\,i\}, \left\{\left\{\frac{i}{2}, 1\right\}, \left\{-\frac{i}{2}, 1\right\}\right\}\right\}$$

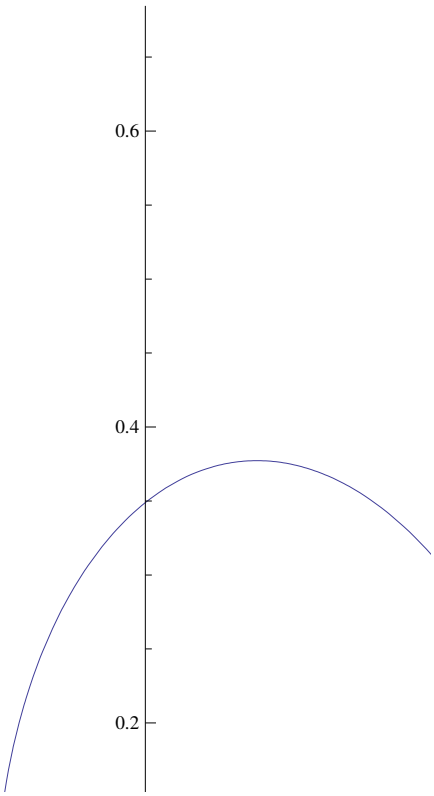
De algemene complexe oplossing is dus c1 {i/2,1} e^(−2+5i)t + c2 {−i/2,1} e^(−2−5i)t met c1,c2 in C.
De algemene reele oplossing is e^{−2t} [r1 {−sin(5t)/2,cos(5t)} + r2 {cos(5t)/2,sin(5t)}}

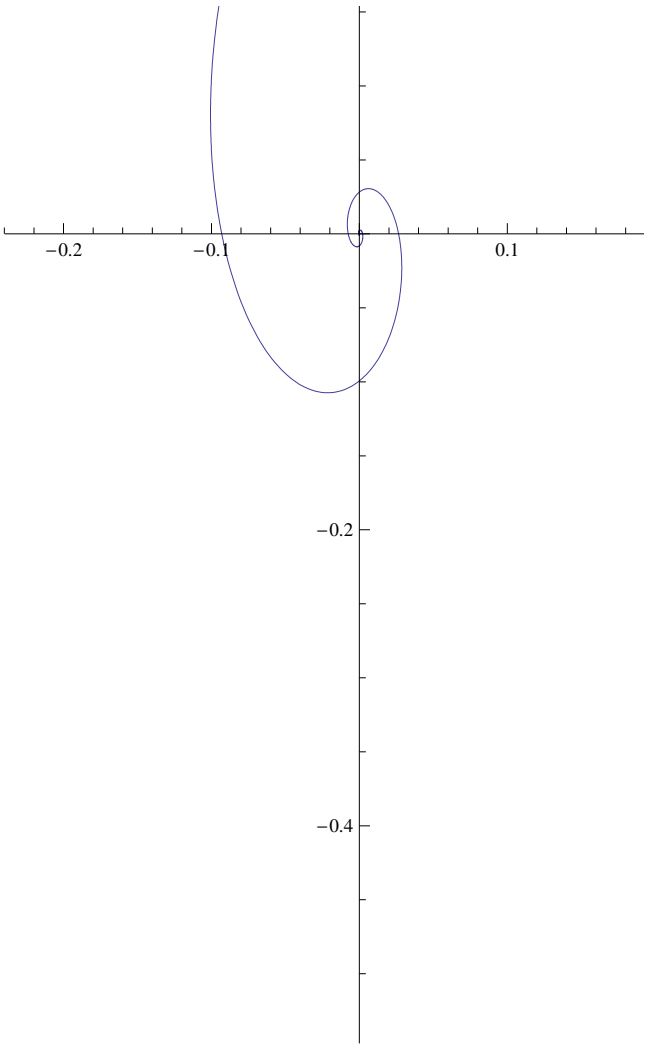
b

Vul t=0 in; dat geeft r1{0,1}+r2{1/2,0}={3,3}. Dus r1=3 en r2=6.

c

```
ParametricPlot[Exp[-2 t] (3 {-Sin[5 t] / 2, Cos[5 t]} + 6 {Cos[5 t] / 2, Sin[5 t]}), {t, 0, 5}]
```





■ d

Makkelijk af te leiden uit V_C=V_R1, V_R1=R1(I_L−I_C), V_C'=I_C/C, V_L=L I_L', V_R2=R2 I_L, V_R2+V_L=−V_C.

Opgave 3

■ a

```
A = {{32, 30}, {30, 7}};

Eigensystem[A]
```

```
{{52, -13}, {{3, 2}, {-2, 3}}}
```

Dus P=(1/Sqrt[13]) {{3,−2},{2,3}} en λ =52 en μ =−13

b

In (u,v)−coordinaten zijn dat de punten +/− {1/2,0}, en in (x,y)−coordinaten dus +/− (1/Sqrt[13]) {3/2,1}. Check:

```
x = 1 / Sqrt[13] {3 / 2, 1};

32 x[[1]]^2 + 60 x[[1]] x[[2]] + 7 x[[2]]^2
```

```
13
```