ANALISI DEI SISTEMI
SOLUZIONE PRE-ESAME 16/11/2011

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Testo A

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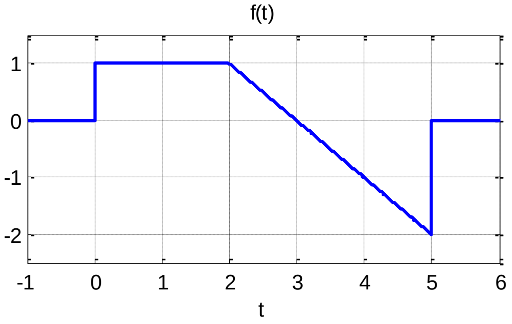
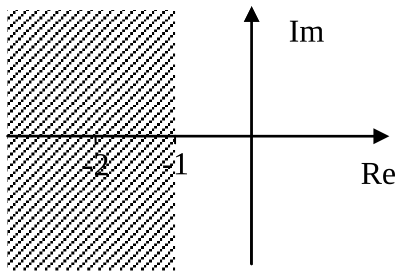
**** Esercizio 1

** 1.(a)



** 1.(b)
- lineare per alfa = 0;
- stazionario per ogni valore di alfa;

** 1.(c)
t_a5% = 3 tau < 3; ==> tau < 1
  ==> tau = -1/alfa < 1 (NB: alfa < 0)
  ==> alfa < -1



**** Esercizio 2

2.(a)
  y_elle = exp(-t)+2*t*exp(-t)

2.(b)
  y_elle = exp(-(t-3))+2*(t-3)*exp(-(t-3))

**** Esercizio 3

A = 1 3
    2 0
B = 2
    1
C = 0 3
D = 0

** 4.(a)

Autovalori
lambda_1 = 3
lambda_2 = -2

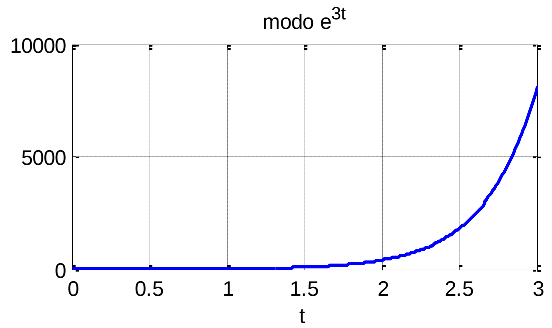
Autovettori

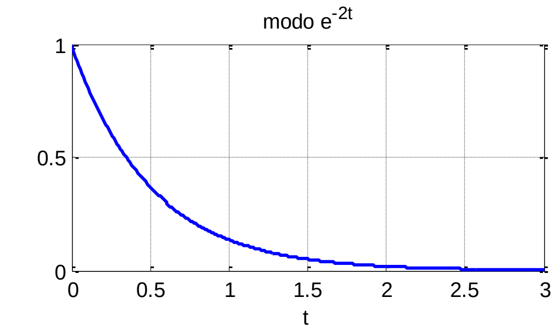
v1 = 3
     2

v2 = 1
    -1

** 4.(b)
Modi: = exp(3*t), exp(-2*t)

Il secondo modo ha t_a5% =3*tau =3/2 = 1.5





** 4.(c)
e_At =
[2/5*exp(-2*t)+3/5*exp(3*t),
            3/5*exp(3*t)-3/5*exp(-2*t)]
[2/5*exp(3*t)-2/5*exp(-2*t),
            3/5*exp(-2*t)+2/5*exp(3*t)]

** 4.(d)
La matrice di ordine 2 ha due autovalori distinti e dunque due autovettori linearmente indipendenti. Essa puo' quindi essere diagonalizzata.

V = 3 1
    2 -1

invV = 0.2 0.2
       0.4 -0.6

A_primo = 3 0
          0 -2
B_primo = 0.6
          0.2
C_primo = 6 -3

D_primo = 0

** 4.(3)

z_elle = [exp(3*t)
           exp(-2*t)]

z_f = [0.4*(exp(3*t) - 1)
        0.2*(1 - exp(-2*t))]

y_elle = 6*exp(3*t)-3*exp(-2*t)

y_f = 2.4*exp(3*t)+0.6*exp(-2*t)-3

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Testo B
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**** Esercizio 1
** 1.(a)
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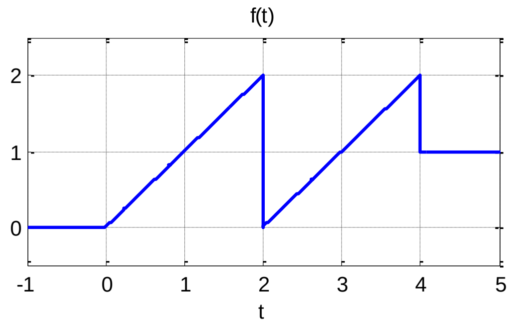


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** 1.(b)
- lineare per ogni valore di alfa;
- stazionario per alfa = 0;

** 1.(c)

zeta = sin(theta) > 0.5;
  ==> theta > 30 gradi
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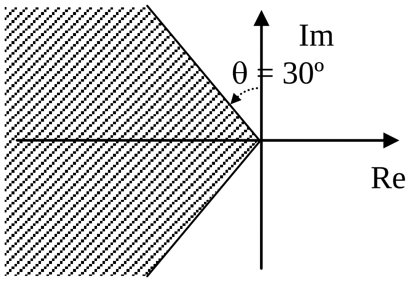


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**** Esercizio 2

** 2.(b)
  y_elle = sqrt(13)/3*exp(-t)*cos(3*t-0.58)
    = exp(-t)*cos(3*t)+2/3*exp(-t)*sin(3*t)

** 2.(b)
  y_elle = sqrt(13)/3*
           exp(-(t-3))*cos(3*(t-3)-0.58)

**** Esercizio 3
A =  1     2
     1     0
B =  1
     2
C =  3     0
D =  0

** 4.(a)

Autovalori
lambda_1 =  2
lambda_2 = -1

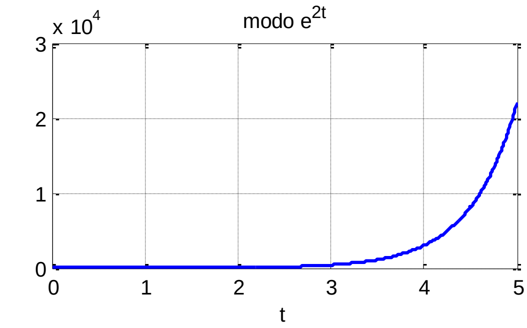
Autovettori

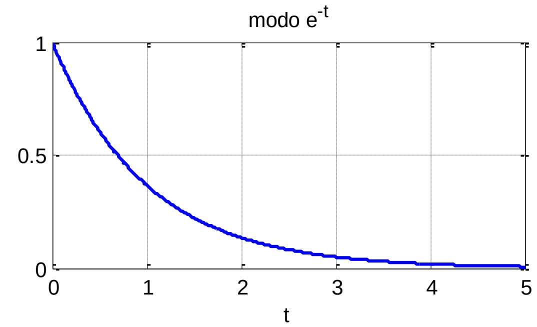
v1 = 2
     1

v2 = 1
    -1

** 4.(b)
Modi: =  exp(2*t), exp(-1*t)

Il secondo modo ha t_a5% =3*tau =3
```



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** 4.(c)
e_At =
[ 2/3*exp(2*t)+1/3*exp(-t),
                 -2/3*exp(-t)+2/3*exp(2*t)]
[ -1/3*exp(-t)+1/3*exp(2*t),
                  1/3*exp(2*t)+2/3*exp(-t)]

** 4.(d)
La matrice di ordine 2 ha due autovalori
distinti e dunque due autovettori
linearmente indipendenti. Essa puo' quindi
essere diagonalizzata.

V = 2    1
    1   -1

invV = 1/3    1/3
       1/3   -2/3

A_primo = 2   0
          0  -1
B_primo = 1
         -1
C_primo = 6     3
D_primo = 0

** 4.(3)

z_elle = [ exp(2*t)
           exp(-t) ]

z_f = [ exp(2*t) -1
        2*(exp(-t)-1) ]

y_elle = 6*exp(2*t)+3*exp(-t)

y_f = 6*exp(2*t)+6*exp(-t)-12
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