

Compitino Matematica Discreta 13.12.2004

Esercizio 1:

```
> z:=sqrt(2)*(1+I);
z := (1 + I)√2

> w:=2-I;
w := 2 - I

> Re(z*w);
3√2

> Im(z/w);
3√2
5

> abs(z*w^2);
10

> t:=(w+conjugate(z))/(conjugate(w)+z);
t := (2 - I + (1 - I)√2) / (2 + I + (1 + I)√2)

> simplify(abs(t));
1

> simplify(Re(t));
1
3

> denom(rationalize(Im(t)));
3

> expand(numer(rationalize(Im(t))));
-2√2
```

Esercizio 2

```
> with(LinearAlgebra):
> A:=Matrix(3,3,[[1,-1,1],[1,-1,5],[-3,1,3]]);
A := 
$$\begin{bmatrix} 1 & -1 & 1 \\ 1 & -1 & 5 \\ -3 & 1 & 3 \end{bmatrix}$$

```

> S:=ScalarMultiply(A+Transpose(A),1/2);

$$S := \begin{bmatrix} 1 & 0 & -1 \\ 0 & -1 & 3 \\ -1 & 3 & 3 \end{bmatrix}$$

> T:=ScalarMultiply(A-Transpose(A),1/2);

$$T := \begin{bmatrix} 0 & -1 & 2 \\ 1 & 0 & 2 \\ -2 & -2 & 0 \end{bmatrix}$$

> Determinant(A);

8

> Determinant(S)+Determinant(T);

-11

> Adjoint(A);

$$\begin{bmatrix} -8 & 4 & -4 \\ -18 & 6 & -4 \\ -2 & 2 & 0 \end{bmatrix}$$

Esercizio 3

> E:=proc(i,j) local mat;mat:=Matrix(2,3,0);mat[i,j]:=1;return mat;end;

E := **proc**(i, j) **local** mat; mat := Matrix(2, 3, 0); mat[i, j] := 1; **return** mat **end proc**

> w:=a*E(1,2)+b*E(1,3)+c*E(2,2)+d*E(2,3);

$$w := \begin{bmatrix} 0 & a & b \\ 0 & c & d \end{bmatrix}$$

> v1:=subs(a=1,b=0,c=0,d=0,w.Transpose(w));

$$v1 := \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$$

> v2:=subs(a=0,b=0,c=1,d=0,w.Transpose(w));

$$v2 := \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$$

> v3:=subs(a=1,b=0,c=1,d=0,w.Transpose(w))-v1-v2;

$$v3 := \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

> a*v1+c*v2+b*v3;

$$\begin{bmatrix} a & b \\ b & c \end{bmatrix}$$