

(\* MATRICI \*)

(\* SOLUZIONE SIMULTANEA DI n SISTEMI \*)

```
Clear[x1, x2, x3];
aa = {{2, -1, 3}, {-2, 3, -1}, {3, -2, 2}};
b1 = {1, -2, -1};
b2 = {2, 0, -1};
b3 = {-1, 2, 2};
bb = {b1, b2, b3};
b = Transpose[bb];
ab1 = {Join[aa[[1]], {b1[[1]]}], Join[aa[[2]], {b1[[2]]}], Join[aa[[3]], {b1[[3]]}}};
ab2 = {Join[aa[[1]], {b2[[1]]}], Join[aa[[2]], {b2[[2]]}], Join[aa[[3]], {b2[[3]]}}};
ab3 = {Join[aa[[1]], {b3[[1]]}], Join[aa[[2]], {b3[[2]]}], Join[aa[[3]], {b3[[3]]}}};
MatrixForm[ab1]
MatrixForm[ab2]
MatrixForm[ab3]
MatrixForm[b]
```

$$\begin{pmatrix} 2 & -1 & 3 & 1 \\ -2 & 3 & -1 & -2 \\ 3 & -2 & 2 & -1 \end{pmatrix}$$

$$\begin{pmatrix} 2 & -1 & 3 & 2 \\ -2 & 3 & -1 & 0 \\ 3 & -2 & 2 & -1 \end{pmatrix}$$

$$\begin{pmatrix} 2 & -1 & 3 & -1 \\ -2 & 3 & -1 & 2 \\ 3 & -2 & 2 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 2 & -1 \\ -2 & 0 & 2 \\ -1 & -1 & 2 \end{pmatrix}$$

```
ab = {Join[aa[[1]], b[[1]]], Join[aa[[2]], b[[2]]], Join[aa[[3]], b[[3]]]};
MatrixForm[ab]
```

$$\begin{pmatrix} 2 & -1 & 3 & 1 & 2 & -1 \\ -2 & 3 & -1 & -2 & 0 & 2 \\ 3 & -2 & 2 & -1 & -1 & 2 \end{pmatrix}$$

(\* INVERSA DI UNA MATRICE \*)

```
Clear[ab, b]
b = {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}};
MatrixForm[b];
ab = {Join[aa[[1]], b[[1]]], Join[aa[[2]], b[[2]]], Join[aa[[3]], b[[3]]]};
MatrixForm[ab]
```

$$\begin{pmatrix} 2 & -1 & 3 & 1 & 0 & 0 \\ -2 & 3 & -1 & 0 & 1 & 0 \\ 3 & -2 & 2 & 0 & 0 & 1 \end{pmatrix}$$

```
ab1 = {ab[[1]], ab[[1]] + ab[[2]], 3 * ab[[1]] - 2 * ab[[3]]};
MatrixForm[ab1]
```

$$\begin{pmatrix} 2 & -1 & 3 & 1 & 0 & 0 \\ 0 & 2 & 2 & 1 & 1 & 0 \\ 0 & 1 & 5 & 3 & 0 & -2 \end{pmatrix}$$

```
ab2 = {ab1[[1]], ab1[[2]], 2*ab1[[3]] - ab1[[2]]}; (* Eliminaz. Gaussiana *)
MatrixForm[ab2]
```

$$\begin{pmatrix} 2 & -1 & 3 & 1 & 0 & 0 \\ 0 & 2 & 2 & 1 & 1 & 0 \\ 0 & 0 & 8 & 5 & -1 & -4 \end{pmatrix}$$

```
x31 = 5/8;
```

```
x21 = (1 - 2*x31) / 2;
```

```
x11 = (1 - 3*x31 + x21) / 2;
```

```
x32 = -1/8;
```

```
x22 = (1 - 2*x32) / 2;
```

```
x12 = (0 - 3*x32 + x22) / 2;
```

```
x33 = -1/2;
```

```
x23 = (0 - 2*x33) / 2;
```

```
x13 = (0 - 3*x33 + x23) / 2;
```

```
ainv = {{x11, x12, x13}, {x21, x22, x23}, {x31, x32, x33}};
```

```
MatrixForm[ainv]
```

```
MatrixForm[Inverse[aa]]
```

```
MatrixForm[Dot[aa, ainv]]
```

$$\begin{pmatrix} -\frac{1}{2} & \frac{1}{2} & 1 \\ -\frac{1}{8} & \frac{5}{8} & \frac{1}{2} \\ \frac{5}{8} & -\frac{1}{8} & -\frac{1}{2} \end{pmatrix}$$

$$\begin{pmatrix} -\frac{1}{2} & \frac{1}{2} & 1 \\ -\frac{1}{8} & \frac{5}{8} & \frac{1}{2} \\ \frac{5}{8} & -\frac{1}{8} & -\frac{1}{2} \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$