```
> f:=(x,y)->x*y-x^3-y^2;
```

$$f := (x, y) \to x\,y - x^3 - y^2$$

```
> f(x,y);
```

$$x\,y - x^3 - y^2$$

```
> f1:=diff(f(x,y),x);
```

$$f1 := y - 3\,x^2$$

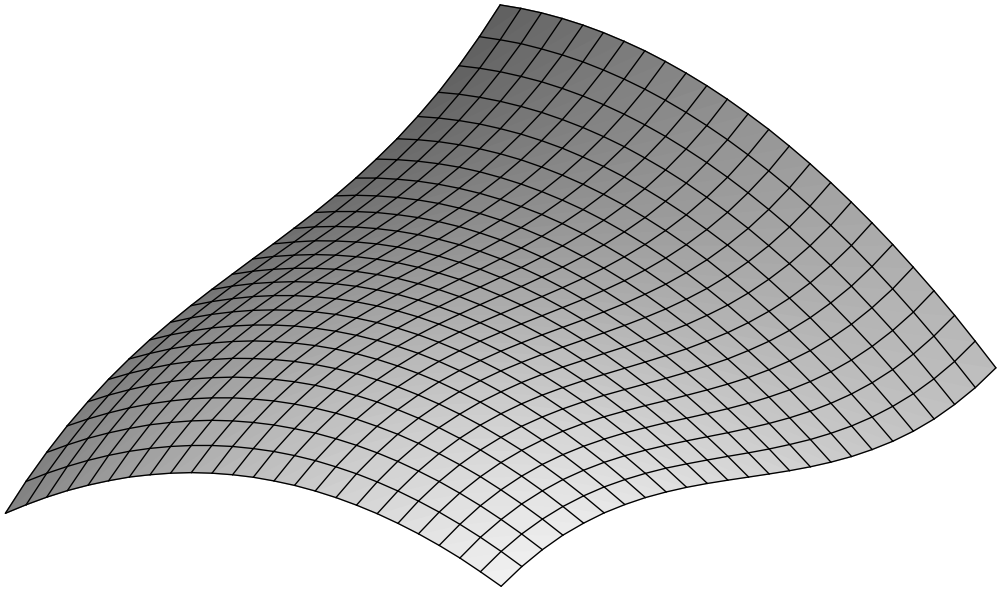
```
> f2:=diff(f(x,y),y);
```

$$f2 := x - 2\,y$$

```
> s:=solve({f1=0,f2=0},{x,y});
```

$$s := \{y = 0, x = 0\}, \{y = \frac{1}{12}, x = \frac{1}{6}\}$$

```
> plot3d(f(x,y),x=-1..1,y=-1..1);
```



```
> fxx:=diff(f(x,y),x,x);
```

$$fxx := -6\,x$$

```
> fxy:=diff(f(x,y),x,y);
```

$$fxy := 1$$

```
> fyy:=diff(f(x,y),y,y);
```

$$fyy := -2$$

```
> diff(f(x,y),y,x);
```

$$1$$

```
> d:=fxx*fyy-fxy^2;
```

$$d := 12\,x - 1$$

```
> subs(s[1],d);
```

$$-1$$

```
> subs(s[2],d);
```

$$1$$

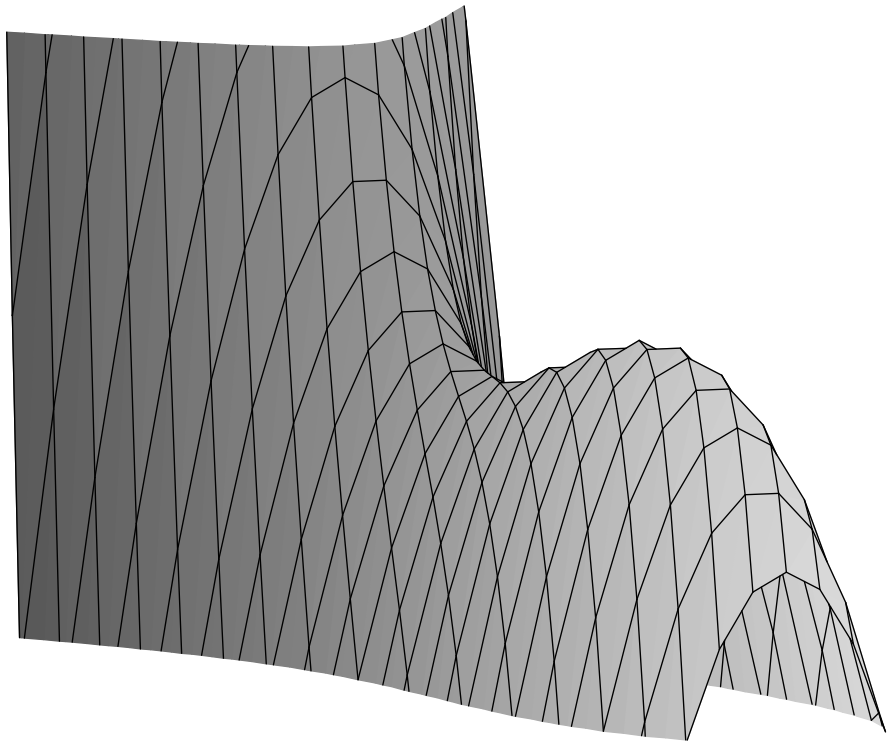
```
> subs(s[1],f(x,y));
```

$$0$$

```
> subs(s[2],f(x,y));
```

$$\frac{1}{432}$$

```
> plot3d(f(x,y),x=-0.3..0.3,y=-0.3..0.3,view=
  -0.01..0.01);
```



```
> with(linalg);
Warning, the protected names norm and trace have been
redefined and unprotected
```

[*BlockDiagonal, GramSchmidt, JordanBlock, LUdecomp, QRdecomp, Wronskian, addcol, addrow, adj, adjoint, angle, augment, backsub, band, basis, bezout, blockmatrix, charmat, charpoly, cholesky, col, coldim, colspace, colspan, companion, concat, cond, copyinto, crossprod, curl, definite, delcols, delrows, det, diag, diverge, dotprod, eigenvals, eigenvalues, eigenvectors, eigenvects, entermatrix, equal, exponential, extend, ffgausselim, fibonacci, forwardsub, frobenius, gausselim, gaussjord, geneqns, genmatrix, grad, hadamard, hermite, hessian, hilbert, htranspose, ihermite, indexfunc, innerprod, intbasis, inverse, ismith, issimilar, iszero, jacobian, jordan, kernel, laplacian, leastsqrs, linsolve, matadd, matrix, minor, minpoly, mulcol, mulrow, multiply, norm, normalize, nullspace, orthog, permanent, pivot, potential, randmatrix, randvector, rank, ratform, row, rowdim, rowspace, rowspan, rref, scalarmul, singularvals, smith, stackmatrix, submatrix, subvector, sumbasis, swapcol, swaprow, sylvester, toeplitz, trace, transpose, vandermonde, vecpotent, vectdim, vector, wronskian*]

```
> f(x,y);
```

$$x\,y - x^3 - y^2$$

```
> grad(f(x,y),[x,y]);
```

$$[y - 3\,x^2, x - 2\,y]$$

```
> solve(%,{x,y});
Error, (in solve) invalid arguments
```

```
> convert(grad(f(x,y),[x,y]),set);
```

$$\{y - 3x^2, x - 2y\}$$

```
> s:=solve(%,{x,y});
```

$$s := \{y = 0, x = 0\}, \{y = \frac{1}{12}, x = \frac{1}{6}\}$$

```
> he:=hessian(f(x,y),[x,y]);
```

$$he := \begin{bmatrix} -6x & 1 \\ 1 & -2 \end{bmatrix}$$

```
> eigenvals(%);
```

$$-3x - 1 + \sqrt{9x^2 - 6x + 2}, -3x - 1 - \sqrt{9x^2 - 6x + 2}$$

```
> he1:=subs(s[1],matrix(he));
```

$$he1 := \begin{bmatrix} 0 & 1 \\ 1 & -2 \end{bmatrix}$$

```
> eigenvals(%);
```

$$-1 + \sqrt{2}, -1 - \sqrt{2}$$

```
> definite(he1,'positive_def');
```

false

```
> definite(he1,'negative_def');
```

false

```
> f:=(x,y,z)->(x^2-2*x*y+z^2)*exp(x-y-z^2);
```

$$f := (x, y, z) \rightarrow (x^2 - 2xy + z^2)\,\mathbf{e}^{(x - y - z^2)}$$

```
> convert(grad(f(x,y,z),[x,y,z]),set);
```

$$\{2z\,\mathbf{e}^{(x - y - z^2)} - 2(x^2 - 2xy + z^2)z\,\mathbf{e}^{(x - y - z^2)},$$

$$-2x\,\mathbf{e}^{(x-y-z^2)} - (x^2-2xy+z^2)\,\mathbf{e}^{(x-y-z^2)},$$

$$(2x-2y)\,\mathbf{e}^{(x-y-z^2)} + (x^2-2xy+z^2)\,\mathbf{e}^{(x-y-z^2)}\}$$

```
> s:=solve(%,{x,y,z});
```

$$s := \{z=0, y=0, x=0\}, \{z=0, x=-2, y=0\},$$

$$\{z=\frac{1}{2}\,\mathrm{RootOf}(-3+\_Z^2, label=\_L1), x=\frac{-1}{2}, y=0\}$$

```
> t:=allvalues(s[3]);
```

$$t := \{z=\frac{1}{2}\sqrt{3}, x=\frac{-1}{2}, y=0\}, \{z=-\frac{1}{2}\sqrt{3}, x=\frac{-1}{2}, y=0\}$$

```
> he:=hessian(f(x,y,z),[x,y,z]);
```

$$he :=$$

$$[2\,\mathbf{e}^{(x-y-z^2)} + 2\,(2x-2y)\,\mathbf{e}^{(x-y-z^2)} + (x^2-2xy+z^2)\,\mathbf{e}^{(x-y-z^2)},$$

$$-2\,\mathbf{e}^{(x-y-z^2)} - 2x\,\mathbf{e}^{(x-y-z^2)} - (2x-2y)\,\mathbf{e}^{(x-y-z^2)}$$

$$-(x^2-2xy+z^2)\,\mathbf{e}^{(x-y-z^2)}, 2z\,\mathbf{e}^{(x-y-z^2)} - 2\,(2x-2y)\,z\,\mathbf{e}^{(x-y-z^2)}$$

$$-2\,(x^2-2xy+z^2)\,z\,\mathbf{e}^{(x-y-z^2)}]$$

$$[-2\,\mathbf{e}^{(x-y-z^2)} - 2x\,\mathbf{e}^{(x-y-z^2)} - (2x-2y)\,\mathbf{e}^{(x-y-z^2)}$$

$$-(x^2-2xy+z^2)\,\mathbf{e}^{(x-y-z^2)},$$

$$4x\,\mathbf{e}^{(x-y-z^2)} + (x^2-2xy+z^2)\,\mathbf{e}^{(x-y-z^2)},$$

$$-2z\,\mathbf{e}^{(x-y-z^2)} + 4xz\,\mathbf{e}^{(x-y-z^2)} + 2\,(x^2-2xy+z^2)\,z\,\mathbf{e}^{(x-y-z^2)}]$$

$$[2\,z\,\mathbf{e}^{(x-y-z^2)} - 2\,(2\,x-2\,y)\,z\,\mathbf{e}^{(x-y-z^2)} - 2\,(x^2-2\,x\,y+z^2)\,z\,\mathbf{e}^{(x-y-z^2)},$$
$$-2\,z\,\mathbf{e}^{(x-y-z^2)} + 4\,x\,z\,\mathbf{e}^{(x-y-z^2)} + 2\,(x^2-2\,x\,y+z^2)\,z\,\mathbf{e}^{(x-y-z^2)},$$
$$2\,\mathbf{e}^{(x-y-z^2)} - 8\,z^2\,\mathbf{e}^{(x-y-z^2)} - 2\,(x^2-2\,x\,y+z^2)\,\mathbf{e}^{(x-y-z^2)} + 4\,(x^2-2\,x\,y+z^2)\,z^2\,\mathbf{e}^{(x-y-z^2)}]$$

```
> he1:=simplify(subs(s[1],matrix(he)));
```

$$he1 := \begin{bmatrix} 2 & -2 & 0 \\ -2 & 0 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

```
> eigenvals(he1);
```

$$2,\ 1+\sqrt{5},\ 1-\sqrt{5}$$

```
> he2:=simplify(subs(s[2],matrix(he)));
```

$$he2 := \begin{bmatrix} -2\,\mathbf{e}^{(-2)} & 2\,\mathbf{e}^{(-2)} & 0 \\ 2\,\mathbf{e}^{(-2)} & -4\,\mathbf{e}^{(-2)} & 0 \\ 0 & 0 & -6\,\mathbf{e}^{(-2)} \end{bmatrix}$$

```
> eigenvals(he2);
```

$$-6\,\mathbf{e}^{(-2)},\ -3\,\mathbf{e}^{(-2)} + \sqrt{9\,(\mathbf{e}^{(-2)})^2 - 4\,\mathbf{e}^{(-4)}},\ -3\,\mathbf{e}^{(-2)} - \sqrt{9\,(\mathbf{e}^{(-2)})^2 - 4\,\mathbf{e}^{(-4)}}$$

```
> evalf(%);
```

$$-.8120116992,\ -.1033869567,\ -.7086247425$$

```
> definite(he2,'negative_def');
```

$$-2\,\mathbf{e}^{(-2)} < 0 \textbf{ and } -4\,(\mathbf{e}^{(-2)})^2 < 0 \textbf{ and } -24\,(\mathbf{e}^{(-2)})^3 < 0$$

```
> he3:=simplify(subs(t[1],matrix(he)));
```

$$he3 := \begin{bmatrix} \mathbf{e}^{(-5/4)} & -\mathbf{e}^{(-5/4)} & \sqrt{3}\,\mathbf{e}^{(-5/4)} \\ -\mathbf{e}^{(-5/4)} & -\mathbf{e}^{(-5/4)} & -\sqrt{3}\,\mathbf{e}^{(-5/4)} \\ \sqrt{3}\,\mathbf{e}^{(-5/4)} & -\sqrt{3}\,\mathbf{e}^{(-5/4)} & -3\,\mathbf{e}^{(-5/4)} \end{bmatrix}$$

```
> eigenvals(he3);
```

$$\frac{1}{3}(-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)} + 162\,\mathbf{e}^{(-15/4)} - 27\,(\mathbf{e}^{(-5/4)})^3 + 6\,I\,\mathrm{sqrt}($$

$$384\,(\mathbf{e}^{(-5/2)})^3 + 108\,(\mathbf{e}^{(-5/2)})^2\,(\mathbf{e}^{(-5/4)})^2 + 972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}$$

$$-729\,(\mathbf{e}^{(-15/4)})^2 + 243\,\mathbf{e}^{(-15/4)}\,(\mathbf{e}^{(-5/4)})^3))^{(1/3)} - 3$$

$$\left(-\frac{8}{3}\,\mathbf{e}^{(-5/2)} - (\mathbf{e}^{(-5/4)})^2\right) \Big/ (-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)} + 162\,\mathbf{e}^{(-15/4)}$$

$$-27\,(\mathbf{e}^{(-5/4)})^3 + 6\,I\,\mathrm{sqrt}(384\,(\mathbf{e}^{(-5/2)})^3 + 108\,(\mathbf{e}^{(-5/2)})^2\,(\mathbf{e}^{(-5/4)})^2$$

$$+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)} - 729\,(\mathbf{e}^{(-15/4)})^2 + 243\,\mathbf{e}^{(-15/4)}\,(\mathbf{e}^{(-5/4)})^3))$$

$$^{(1/3)} - \mathbf{e}^{(-5/4)}, -\frac{1}{6}(-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)} + 162\,\mathbf{e}^{(-15/4)} - 27\,(\mathbf{e}^{(-5/4)})^3 +$$

$$6\,I\,\mathrm{sqrt}(384\,(\mathbf{e}^{(-5/2)})^3 + 108\,(\mathbf{e}^{(-5/2)})^2\,(\mathbf{e}^{(-5/4)})^2$$

$$+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)} - 729\,(\mathbf{e}^{(-15/4)})^2 + 243\,\mathbf{e}^{(-15/4)}\,(\mathbf{e}^{(-5/4)})^3))$$

$$
{}^{(1/3)}
+\frac{3}{2}\left(-\frac{8}{3}\,\mathbf{e}^{(-5/2)}-\left(\mathbf{e}^{(-5/4)}\right)^{2}\right)\Big/\left(-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\right.
$$

$$
+162\,\mathbf{e}^{(-15/4)}-27\left(\mathbf{e}^{(-5/4)}\right)^{3}+6\,I\,\mathrm{sqrt}\left(384\left(\mathbf{e}^{(-5/2)}\right)^{3}\right.
$$

$$
\left.+108\left(\mathbf{e}^{(-5/2)}\right)^{2}\left(\mathbf{e}^{(-5/4)}\right)^{2}+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}\right.
$$

$$
\left.\left.-729\left(\mathbf{e}^{(-15/4)}\right)^{2}+243\,\mathbf{e}^{(-15/4)}\left(\mathbf{e}^{(-5/4)}\right)^{3}\right)\right)^{(1/3)}-\mathbf{e}^{(-5/4)}+\frac{1}{2}\,I\sqrt{3}\left(\frac{1}{3}\right.\left(
$$

$$
-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}+162\,\mathbf{e}^{(-15/4)}-27\left(\mathbf{e}^{(-5/4)}\right)^{3}+6\,I\,\mathrm{sqrt}\left(\right.
$$

$$
384\left(\mathbf{e}^{(-5/2)}\right)^{3}+108\left(\mathbf{e}^{(-5/2)}\right)^{2}\left(\mathbf{e}^{(-5/4)}\right)^{2}+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}
$$

$$
\left.\left.-729\left(\mathbf{e}^{(-15/4)}\right)^{2}+243\,\mathbf{e}^{(-15/4)}\left(\mathbf{e}^{(-5/4)}\right)^{3}\right)\right)^{(1/3)}+3
$$

$$
\left(-\frac{8}{3}\,\mathbf{e}^{(-5/2)}-\left(\mathbf{e}^{(-5/4)}\right)^{2}\right)\Big/\left(-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}+162\,\mathbf{e}^{(-15/4)}\right.
$$

$$
-27\left(\mathbf{e}^{(-5/4)}\right)^{3}+6\,I\,\mathrm{sqrt}\left(384\left(\mathbf{e}^{(-5/2)}\right)^{3}+108\left(\mathbf{e}^{(-5/2)}\right)^{2}\left(\mathbf{e}^{(-5/4)}\right)^{2}\right.
$$

$$
\left.\left.+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}-729\left(\mathbf{e}^{(-15/4)}\right)^{2}+243\,\mathbf{e}^{(-15/4)}\left(\mathbf{e}^{(-5/4)}\right)^{3}\right)\right)
$$

$$
{}^{(1/3)}\Bigg)-\frac{1}{6}\left(-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}+162\,\mathbf{e}^{(-15/4)}-27\left(\mathbf{e}^{(-5/4)}\right)^{3}+6\,I\,\mathrm{sqrt}\right.\left(
$$

$$
384\left(\mathbf{e}^{(-5/2)}\right)^{3}+108\left(\mathbf{e}^{(-5/2)}\right)^{2}\left(\mathbf{e}^{(-5/4)}\right)^{2}+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}
$$

$$
\left.\left.-729\left(\mathbf{e}^{(-15/4)}\right)^{2}+243\,\mathbf{e}^{(-15/4)}\left(\mathbf{e}^{(-5/4)}\right)^{3}\right)\right)^{(1/3)}+\frac{3}{2}
$$

$$\left(-\frac{8}{3}\,\mathbf{e}^{(-5/2)}-(\mathbf{e}^{(-5/4)})^{2}\right)\Big/\ (-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}+162\,\mathbf{e}^{(-15/4)}$$

$$-27\,(\mathbf{e}^{(-5/4)})^{3}+6\,I\,\mathrm{sqrt}(384\,(\mathbf{e}^{(-5/2)})^{3}+108\,(\mathbf{e}^{(-5/2)})^{2}\,(\mathbf{e}^{(-5/4)})^{2}$$

$$+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}-729\,(\mathbf{e}^{(-15/4)})^{2}+243\,\mathbf{e}^{(-15/4)}\,(\mathbf{e}^{(-5/4)})^{3}))$$

$$^{(1/3)}-\mathbf{e}^{(-5/4)}-\frac{1}{2}\,I\sqrt{3}\left(\frac{1}{3}\,(-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}+162\,\mathbf{e}^{(-15/4)}\right.$$

$$-27\,(\mathbf{e}^{(-5/4)})^{3}+6\,I\,\mathrm{sqrt}(384\,(\mathbf{e}^{(-5/2)})^{3}+108\,(\mathbf{e}^{(-5/2)})^{2}\,(\mathbf{e}^{(-5/4)})^{2}$$

$$+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}-729\,(\mathbf{e}^{(-15/4)})^{2}+243\,\mathbf{e}^{(-15/4)}\,(\mathbf{e}^{(-5/4)})^{3}))$$

$$^{(1/3)}+3\left(-\frac{8}{3}\,\mathbf{e}^{(-5/2)}-(\mathbf{e}^{(-5/4)})^{2}\right)\Big/\ (-108\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}$$

$$+162\,\mathbf{e}^{(-15/4)}-27\,(\mathbf{e}^{(-5/4)})^{3}+6\,I\,\mathrm{sqrt}(384\,(\mathbf{e}^{(-5/2)})^{3}$$

$$+108\,(\mathbf{e}^{(-5/2)})^{2}\,(\mathbf{e}^{(-5/4)})^{2}+972\,\mathbf{e}^{(-5/2)}\,\mathbf{e}^{(-5/4)}\,\mathbf{e}^{(-15/4)}$$

$$\left.-729\,(\mathbf{e}^{(-15/4)})^{2}+243\,\mathbf{e}^{(-15/4)}\,(\mathbf{e}^{(-5/4)})^{3}))^{(1/3)}\right)$$

```
> evalf(%);
```

$$.6887709965-.1\,10^{-9}\,I,\ -1.209530831-.1732050808\,10^{-9}\,I,$$

$$-.3387545561+.1732050808\,10^{-9}\,I$$

```
> maximize(f(x,y,z),x=-3..3,y=-3..3,z=-3..3,l
  ocation=true);
```

$$27\,\mathbf{e}^{6},\ \{[\{z=0,y=-3,x=3\},27\,\mathbf{e}^{6}]\}$$

```
>
> A:=matrix(2,3,[4,5,6,3,4,2]);
```

$$A := \begin{bmatrix} 4 & 5 & 6 \\ 3 & 4 & 2 \end{bmatrix}$$

```
> b:=vector([5,6]);
```

$$b := [5, 6]$$

```
> linsolve(A,b);
```

$$[-10 - 14\,\_t_1, 9 + 10\,\_t_1, \_t_1]$$

```
> B:=matrix(2,2,[3,7,u,v]);
```

$$B := \begin{bmatrix} 3 & 7 \\ u & v \end{bmatrix}$$

```
> C:=multiply(A,B);
Error, (in multiply) non matching dimensions for
vector/matrix product

> C:=multiply(B,A);
```

$$C := \begin{bmatrix} 33 & 43 & 32 \\ 4\,u + 3\,v & 5\,u + 4\,v & 6\,u + 2\,v \end{bmatrix}$$

```
> multiply(B,B,A);
```

$$\begin{bmatrix} 99 + 28\,u + 21\,v & 129 + 35\,u + 28\,v & 96 + 42\,u + 14\,v \\ 33\,u + 4\,v\,u + 3\,v^2 & 43\,u + 5\,v\,u + 4\,v^2 & 32\,u + 6\,v\,u + 2\,v^2 \end{bmatrix}$$

```
> transpose(A);
```

$$\begin{bmatrix} 4 & 3 \\ 5 & 4 \\ 6 & 2 \end{bmatrix}$$

```
> matrix(A);
```

$$\begin{bmatrix} 4 & 5 & 6 \\ 3 & 4 & 2 \end{bmatrix}$$

```
> matrix(B);
```

$$\begin{bmatrix} 3 & 7 \\ u & v \end{bmatrix}$$

```
> charpoly(B,x);
```

$$x^2 - x\,v - 3\,x + 3\,v - 7\,u$$

```
> factor(%);
```

$$x^2 - x\,v - 3\,x + 3\,v - 7\,u$$

```
> eigenvals(B);
```

$$\frac{3}{2} + \frac{1}{2}v + \frac{1}{2}\sqrt{9 - 6\,v + v^2 + 28\,u},\ \frac{3}{2} + \frac{1}{2}v - \frac{1}{2}\sqrt{9 - 6\,v + v^2 + 28\,u}$$

```
> eigenvectors(B);
```

$$\left[\frac{3}{2} + \frac{1}{2}v + \frac{1}{2}\sqrt{9 - 6\,v + v^2 + 28\,u},\ 1,\ \left\{\left[1, -\frac{3}{14} + \frac{1}{14}v + \frac{1}{14}\sqrt{9 - 6\,v + v^2 + 28\,u}\right]\right\}\right], \left[\frac{3}{2} + \frac{1}{2}v - \frac{1}{2}\sqrt{9 - 6\,v + v^2 + 28\,u},\ 1,\ \left\{\left[1, -\frac{3}{14} + \frac{1}{14}v - \frac{1}{14}\sqrt{9 - 6\,v + v^2 + 28\,u}\right]\right\}\right]$$

```
> minpoly(B,x);
```

$$3\,v - 7\,u + (-3 - v)\,x + x^2$$

```
> A:=matrix(3,3,[0,0,0,0,0,0,0,0,1]);
```

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

```
> eigenvals(A);
```

$$0, 0, 1$$

```
> charpoly(A,x);
```

$$x^2 (x-1)$$

```
> eigenvectors(A);
```

$$[1, 1, \{[0, 0, 1]\}], [0, 2, \{[0, 1, 0], [1, 0, 0]\}]$$

```
> F:=(i,j)->1/(i+j);
```

$$F := (i, j) \rightarrow \frac{1}{i+j}$$

```
> F(i,j);
```

$$\frac{1}{i+j}$$

```
> F(3,4);
```

$$\frac{1}{7}$$

```
> M:=matrix(6,6,F);
```

$$M := \begin{bmatrix} \frac{1}{2} & \frac{1}{3} & \frac{1}{4} & \frac{1}{5} & \frac{1}{6} & \frac{1}{7} \\ \frac{1}{3} & \frac{1}{4} & \frac{1}{5} & \frac{1}{6} & \frac{1}{7} & \frac{1}{8} \\ \frac{1}{4} & \frac{1}{5} & \frac{1}{6} & \frac{1}{7} & \frac{1}{8} & \frac{1}{9} \\ \frac{1}{5} & \frac{1}{6} & \frac{1}{7} & \frac{1}{8} & \frac{1}{9} & \frac{1}{10} \\ \frac{1}{6} & \frac{1}{7} & \frac{1}{8} & \frac{1}{9} & \frac{1}{10} & \frac{1}{11} \\ \frac{1}{7} & \frac{1}{8} & \frac{1}{9} & \frac{1}{10} & \frac{1}{11} & \frac{1}{12} \end{bmatrix}$$

```
> det(M);
```

$$\frac{1}{17215360039342080000}$$

```
>
```