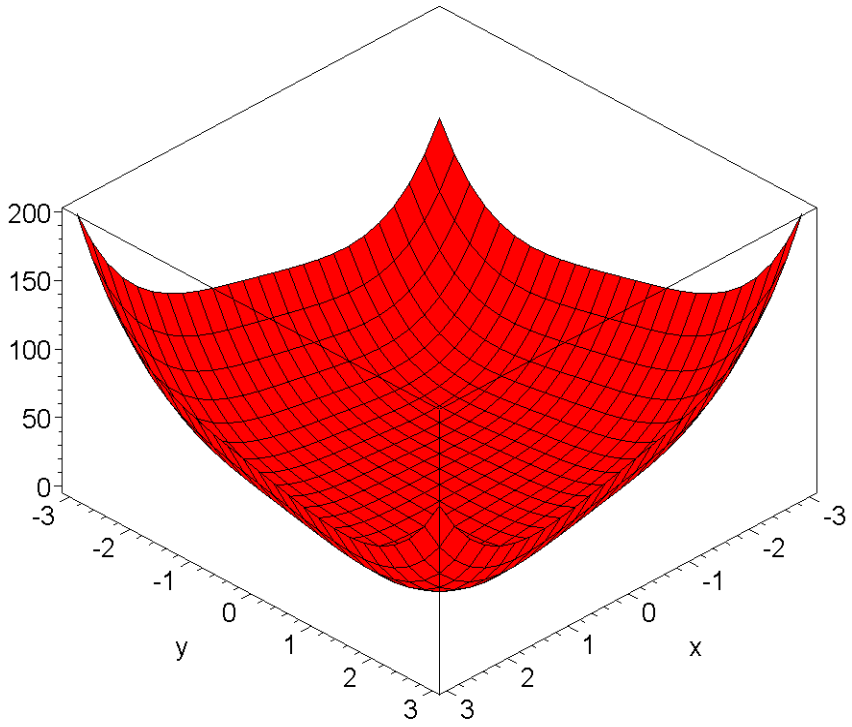
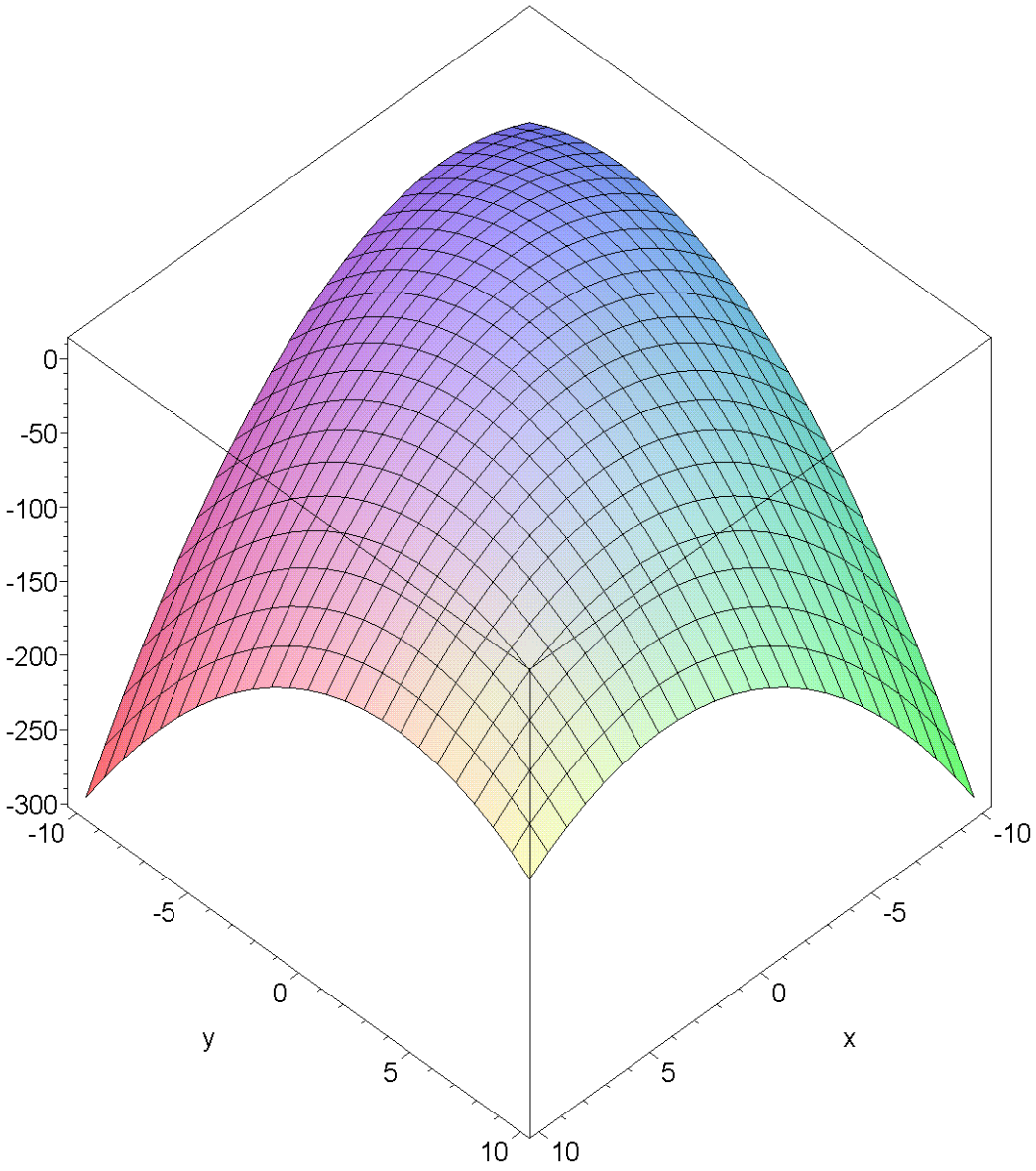
```
> restart:with( plots):
```
```
Warning, the name changecoords has been redefined
```
```
>
```
```
> g := (x, y) -> x^4+y^4-4*x*y+1;
  plot3d(g(x,y), x = -3..3,
  y = -3..3, color=red,axes=boxed);
```

$$g := (x, y) \to x^4 + y^4 - 4\,y\,x + 1$$




```
>
>
```
Text page 1030 Ex 3
```
> g := (x, y) -> x*y-x^2-y^2-2*y-2*x+4;plot3d(g(x,y), x = -10..10, y
  = -10 .. 10, axes=boxed);
```

$$g := (x, y) \to y\,x - x^2 - y^2 - 2\,y - 2\,x + 4$$




```
> gx :=  diff(g(x,y),x); gy:=diff(g(x,y),y);gxx :=
  diff(g(x,y),x,x);
```

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

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

$$gxx := -2$$

solve them from gx: y=2x+2 but x=2y+2 so y=2(2y+2)+2 so 0=3y+6 or y=-2 and x = -2

```
> diff(g(x,y),x,x)* diff(g(x,y),y,y)-diff(g(x,y),x,y)*
  diff(g(x,y),x,y);# find Hesssian
>
```

3

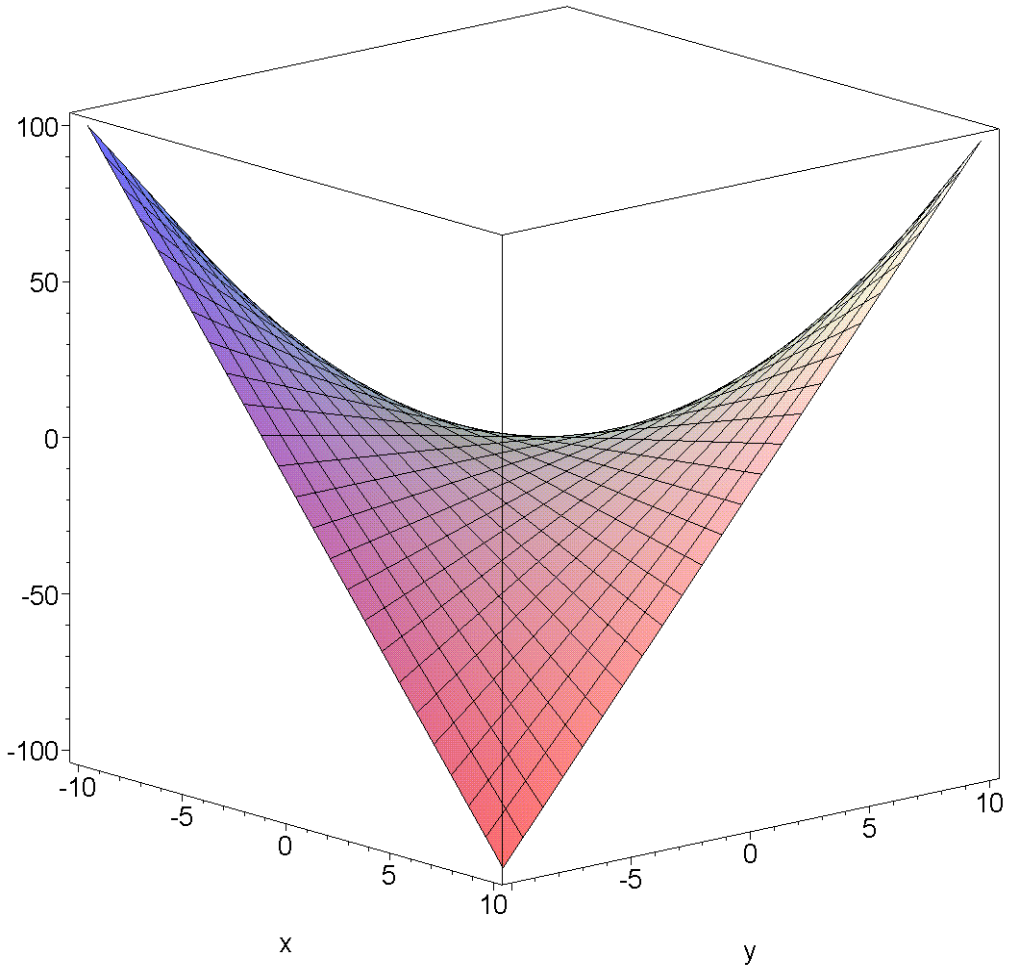
says (-2,-2) is local max

0.6467721991

Text page 1030 Ex 3

```
> g := (x, y) -> x*y;plot3d(g(x,y), x = -10..10, y = -10 .. 10,
  axes=boxed);
```

$$g := (x, y) \to y\, x$$




```
> gx :=  diff(g(x,y),x); gy:=diff(g(x,y),y);gxx :=
  diff(g(x,y),x,x);
```

$$gx := y$$

$$gy := x$$

$$gxx := 0$$

solve them from gx: y=2x+2 but x=2y+2 so y=2(2y+2)+2 so 0=3y+6 or y=-2 and x = -2

```
> diff(g(x,y),x,x)* diff(g(x,y),y,y)-diff(g(x,y),x,y)*
  diff(g(x,y),x,y);# find Hesssian
>
```

$$-1$$

says (0,0) is saddle point

```
>
>

> g := (x, y) -> x*y*(x^2-y^2)/(x^2+y^2);

> plot3d(g(x,y), x = -10..10,y = -10..10, color=red,axes=boxed);
```

$$g := (x, y) \rightarrow \frac{x\,y\,(x^2 - y^2)}{x^2 + y^2}$$

> v