math165implicit.mw
Examples of Implicit Differentiation
Maple 10 Worksheet for Problems in Math 165 - Calculus for Business.
First load plots and student:

```
> restart:with( student):with (plots):
> writeit:=proc(str,val)
      description `write text(string) = value`;
      cat(str,convert(val,string));
   end proc;
```

$writeit := \mathbf{proc}(str, val)$ (1)

    description `write text(string) = value`;

    $cat(str, convert(val, string))$

 end proc
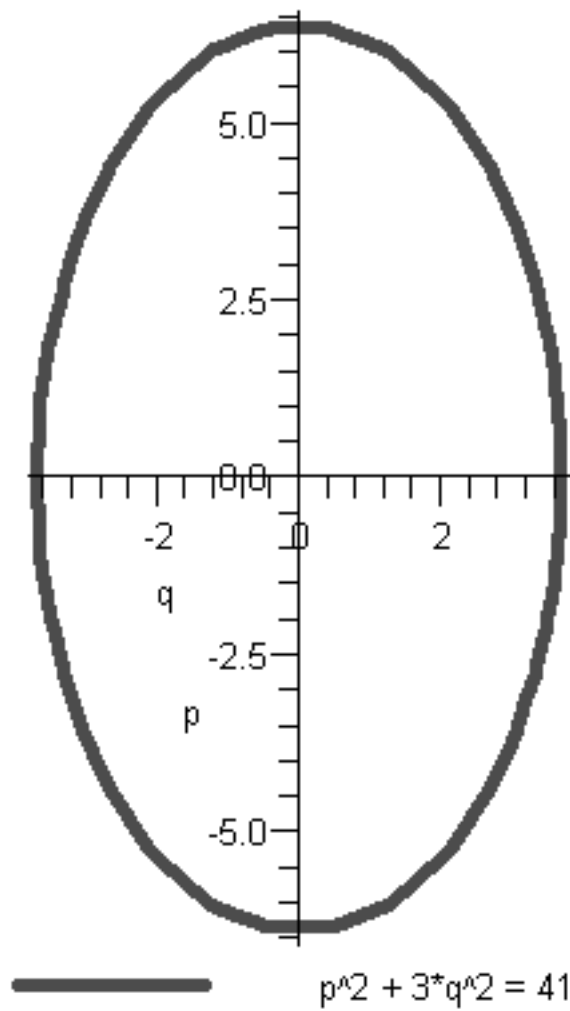
Example p^2 + 3 q^2 = 41

```
>
> implicitplot(p^2 + 3*q^2 = 41,q = -10 .. 10, p= -10 .. 10,scaling
  = constrained,labels=[`q`,`p`],thickness=3,legend=`p^2 + 3*q^2 =
  41`);
  `dp/dq`:=implicitdiff(p^2 + 3*q^2 = 41,p,q);
```
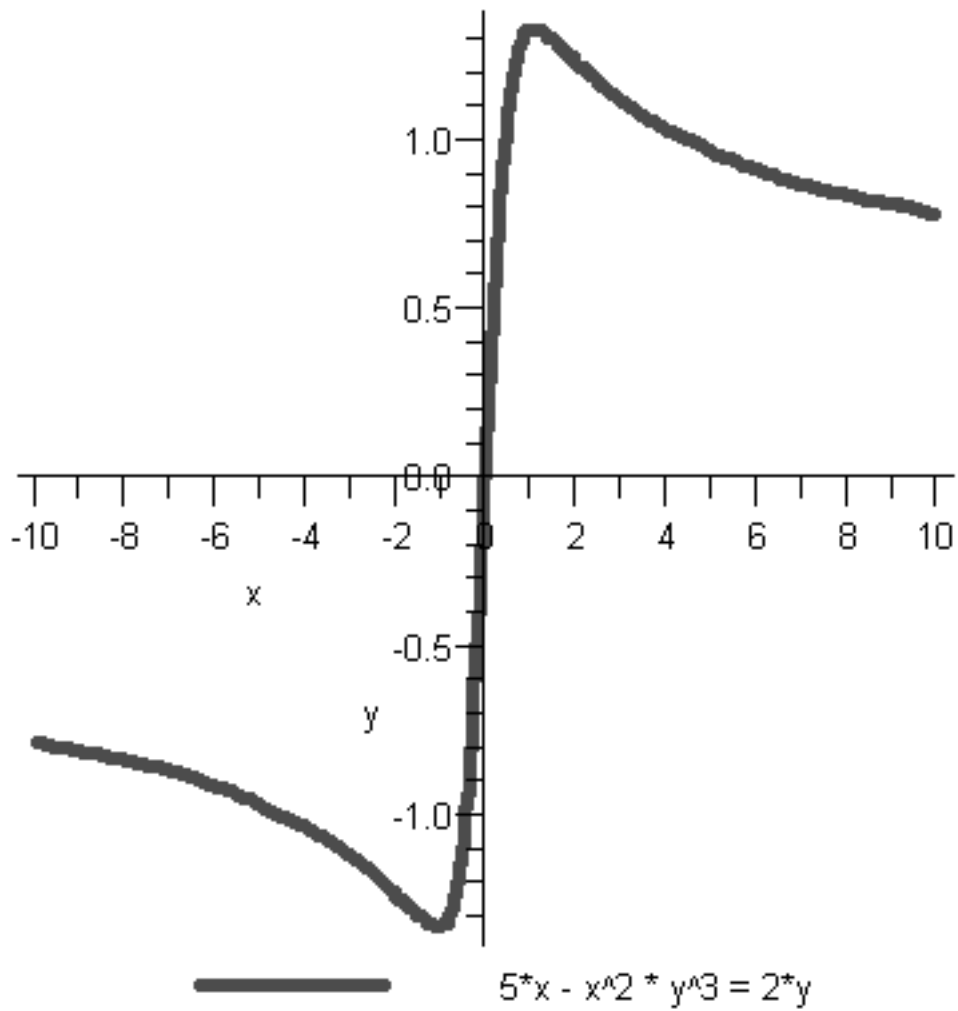
$$p\textasciicircum 2 + 3*q\textasciicircum 2 = 41$$

$$dp/dq := -\frac{3\,q}{p} \tag{2}$$

Problem 2.6.10

```
> implicitplot(5*x - x^2 * y^3 = 2*y,x = -10 .. 10, y = -10 .
  .10,scaling = unconstrained,labels=[`x`,`y`],thickness=3,legend=
  `5*x - x^2 * y^3 = 2*y`,numpoints=10000);
```
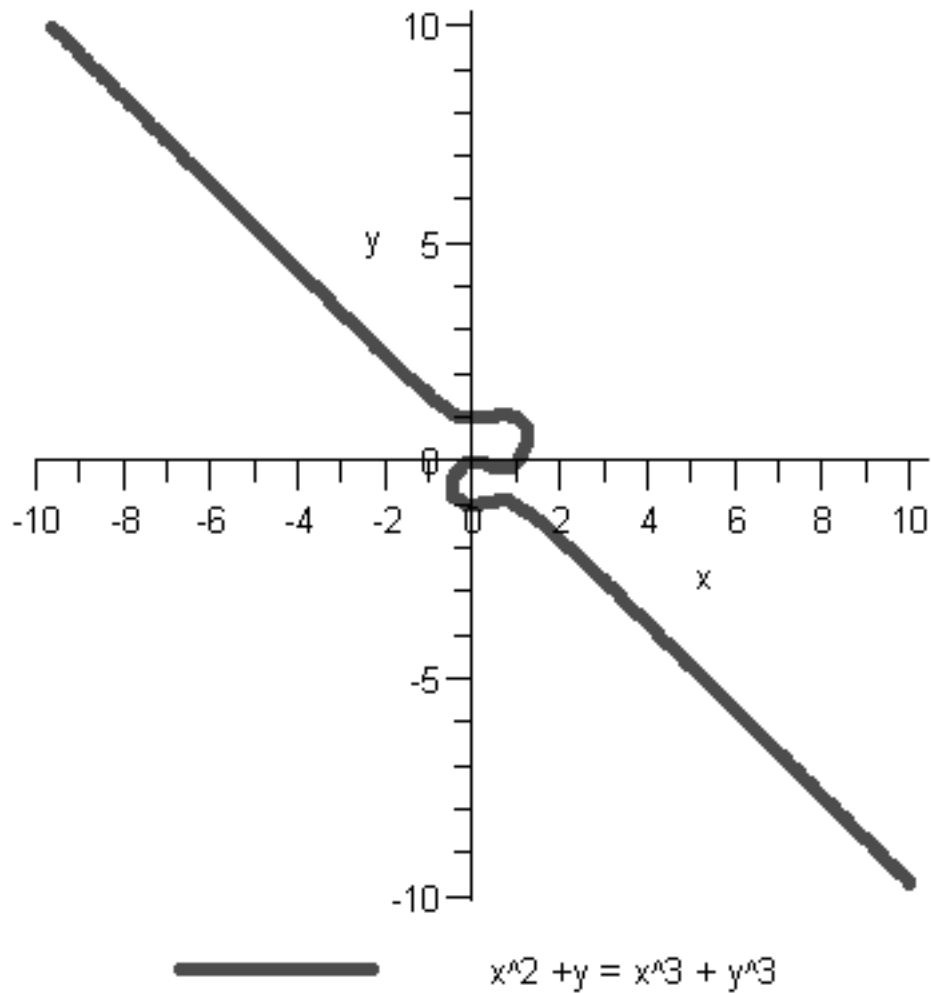
$$5*x - x\verb|^|2 * y\verb|^|3 = 2*y$$

>

> `` `dy/dx`:=implicitdiff(5*x - x^2 * y^3 = 2*y,y,x); ``

$$dy/dx := -\frac{-5 + 2\,x\,y^3}{2 + 3\,x^2 y^2} \qquad\qquad (3)$$

Problem 2.6.8

```
> implicitplot(x^2 +y = x^3 + y^3,x = -10 .. 10, y = -10 ..10,
  scaling = unconstrained,labels=[`x`,`y`],thickness=3,legend=`x^2 +
  y = x^3 + y^3`,numpoints=10000);
```
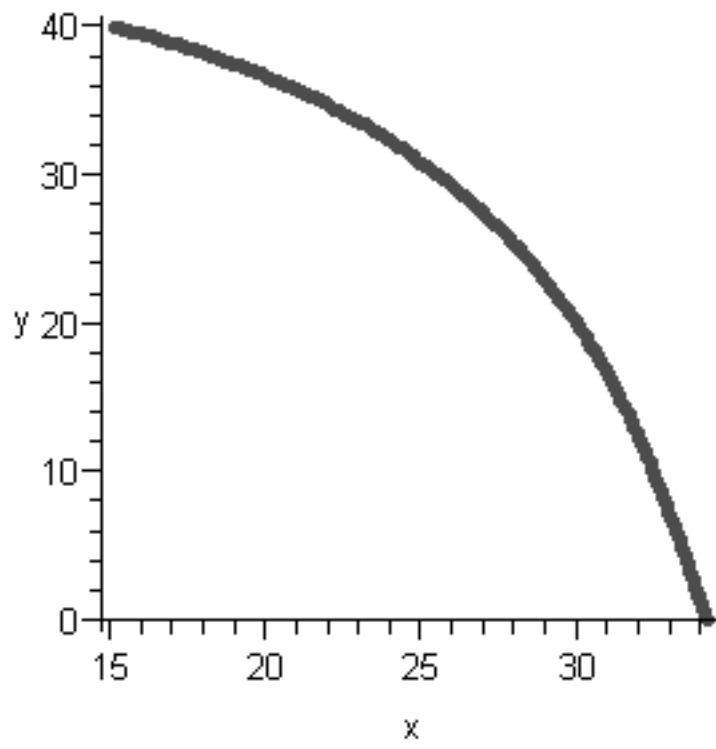
x^2 +y = x^3 + y^3

>

Example 2.6.4

>

```
`dy/dx`:= implicitdiff(2*x^3 + x^2 * y + y^3=80000,y,x);
implicitplot(2*x^3 + x^2 * y + y^3=80000,x =0..40, y = 0 .. 40,
scaling = unconstrained,labels=[`x`,`y`],thickness=3,legend=`Q(x,
y) = 80000`,numpoints=10000);
```

$$dy/dx := -\frac{2\,x\,(3\,x + y)}{x^2 + 3\,y^2}$$

Q(x,y) = 80000