Implicit Functions
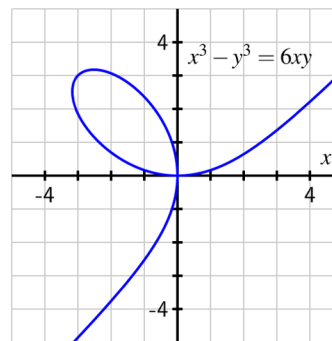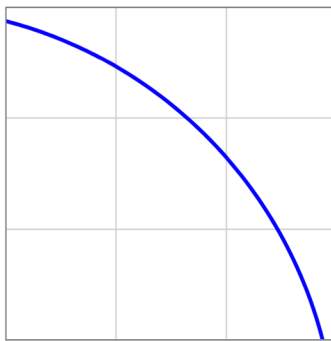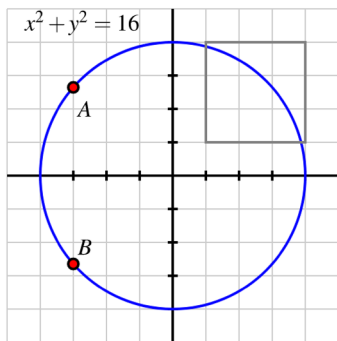
Preview, Section 2.7

> **Preview Activity 2.7.1.** Let f be a differentiable function of x (whose formula is not known) and recall that $\frac{d}{dx}[f(x)]$ and $f'(x)$ are interchangeable notations. Determine each of the following derivatives of combinations of explicit functions of x, the unknown function f, and an arbitrary constant c.
>
> a. $\dfrac{d}{dx}\left[x^2 + f(x)\right]$ b. $\dfrac{d}{dx}\left[x^2 f(x)\right]$
>
> c. $\dfrac{d}{dx}\left[c + x + f(x)^2\right]$ d. $\dfrac{d}{dx}\left[f(x^2)\right]$
>
> e. $\dfrac{d}{dx}\left[x f(x) + f(cx) + c f(x)\right]$

a. Sum rule, power rule, implicit differentiation:

In[3760]:= **D[x^2 + f[x], x]**

Out[3760]= $2\,x + f'[x]$

b. Product rule, power rule, implicit differentiation:

In[3761]:= **D[x^2 f[x], x]**

Out[3761]= $2\,x\,f[x] + x^2\,f'[x]$

c. Sum rule, power rule, chain rule, implicit differentiation:

In[3762]:= **D[c + x + f[x]^2, x]**

Out[3762]= $1 + 2\,f[x]\,f'[x]$

d. chain rule, power rule, implicit differentiation:

In[3763]:= `D[f[x^2], x]`

Out[3763]= $2 x f'\left[x^2\right]$

e. Sum rule, product rule, chain rule, constant multiple rule, s implicit differentiation:

In[3764]:= `D[x f[x] + f[c x] + c f[x], x]`

Out[3764]= $f[x] + c f'[x] + x f'[x] + c f'[c x]$