1.

(a). Find $\frac{d}{dx}\left[x^2y\right]$ if you assume y is constant.

(b). Find $\frac{d}{dx}\left[x^2y\right]$ if you assume y is a function of x, ie. $y = y(x)$.

Recall, an **explicit function** is one of the form $y = f(x)$,
where the y is all by itself on one side and everything else is on the other side.

2. Use your calculator to graph the following explicitly defined functions. Sketch them below.

(a). $y = 3x^2 - 5$

(b). $y = \sin 4x$

(c). $y = \frac{x+1}{x-1}$

An **implicit function** or curve is defined by an equation relating x and y.
However, the y may show up in a more complicated way (i.e. you may not be able to isolate y by itself on one side of the equation)

3. $x^2 + y^2 = 25$ is an implicitly defined relationship. [You should recognize this as a familiar graph.]

(a). Sketch a graph $x^2 + y^2 = 25$.

(b). If $x = 4$, do you know what y must be on this curve? If so, find these values of y.

So does y depend on x or is y independent of x?

(c). Go back to your sketch and draw the tangent line(s) to this curve at the point(s) where $x = 4$.

4. $xy = 1$ is an implicitly define function.

(a). Does y depend on x or is y independent of x?

Given the following values for x, find what y must be on this curve and complete the table. Use the table to sketch a picture of $xy = 1$.

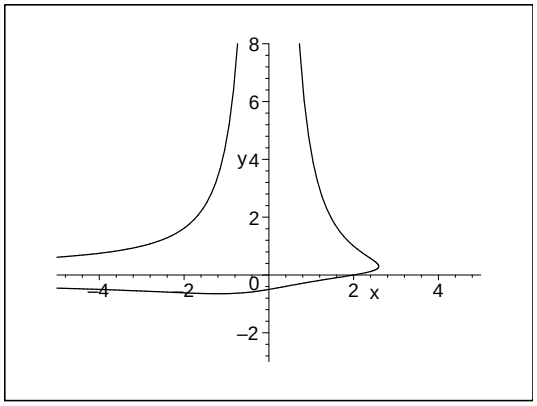
x	y
-4	
-3	
-2	
-1	
-1/2	
-1/3	
-1/4	
1/4	
1/3	
1/2	
1	
2	$\frac{1}{2}$
3	
4	

(b). Sketch the tangent to this curve at the point $(2, \frac{1}{2})$.

5. $x^3y^2 - 4xy + x^2 = 2x$ is an implicitly defined curve, whose graph is given below.

(a). Do you think that y depends on x?

(b). Sketch the tangent line to this curve at the point $(2, 0)$.



6. Based on problems 3-5, ***briefly*** explain why it makes sense to talk about the derivative of y with respect to x (i.e. $\frac{dy}{dx}$) for implicitly defined curves.