

Math 151  
Exploring Derivatives

1. Find the following derivatives.

(a)  $f(x) = \frac{x^3+4x^2-x-17}{x^2+1}$ ;  $f'(x)$

(b)  $y = \sin(x^3) + \cos(\pi^3)$ ;  $\frac{dy}{dx}$

(c)  $y = x^6 - 4x^5 + x^2 - 17x + 106$ ;  $\frac{d^2y}{dx^2}$

(d)  $s = \sin \sqrt{t^2 + 4}$ ;  $\frac{ds}{dt}$

(e)  $g(x) = \tan x$ ;  $g''(x)$

(f)  $h(t) = t^2 \sqrt[3]{(t^3 + 17)^4}$ ;  $h'(t)$

2. Here is a table of values for a couple of functions and their derivatives.

$x$	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-2	1	4	5	-4
0	2	-2	3	7
2	4	8	1	9
3	2	-7	-4	4
4	1	-1	-2	8

For  $h(x) = g(f(x))$ ,  $j(x) = \frac{f(x)}{g(x)}$ , and  $k(x) = f(x^2)$ , compute:

(a)  $h'(0)$

(b)  $j'(3)$

(c)  $k'(2)$

3. Find the tangent line to the curve

$$x^3y^2 + x^2 - y = 3$$

at the point  $(1, 2)$ .

4. Find the maximum and minimum values of the given functions.

(a)  $f(x) = x^3 - 12x + 7$  on the interval  $[-3, 3]$

(b)  $g(x) = \sqrt[3]{(x-4)^2}$  on the interval  $[4, 12]$

(c)  $h(x) = 1/x$  on the interval  $[-1, 1]$

5. The graphs in the righthand column represent the derivatives of the functions graphed in the lefthand column. Match each function with its derivative.

