

## Exercises from yesterday

1. If  $f(x) = x - 2\cos(x)$ , find the maximum value and the minimum value of the function on the interval where  $-2 \leq x \leq 0$ .  
[4.1 #68. Max when  $x = -2$ ; min when  $x = -\pi/6$ .]
2. If  $x^2 + xy + y^3 = 1$ , find the value of the third derivative  $y'''$  at the point where  $x = 1$ . [3.5 #40. Answer 42.]
3. Find an equation of the line tangent to the curve given by parametric equations  $x = 3t^2 + 1$  and  $y = 2t^3 + 1$  at the point on the curve where  $x = 4$  and  $y = 3$ .  
[Appendix K.2 #22. Slope equals 1.]

## What $f'$ and $f''$ say about the graph of $f$

- ▶ If  $f'$  is positive on an interval, then the graph of  $f$  is increasing.
- ▶ If  $f'$  is negative on an interval, then the graph of  $f$  is decreasing.
- ▶ If  $f''$  is positive on an interval, then the graph lies above the tangent line: the graph is *convex* or *concave up*.
- ▶ If  $f''$  is negative on an interval, then the graph lies below the tangent line: the graph is *concave* or *concave down*.

An *inflection point* is a point on the graph where the direction of concavity changes.

## Assignment (not to hand in)

- ▶ Section 4.3, Exercises 5, 7, 11, 19, 21, 25, 29, 39, 43, 45, 51, 69, 73, 89.