Last Tuesday: derivatives & rates of change applications

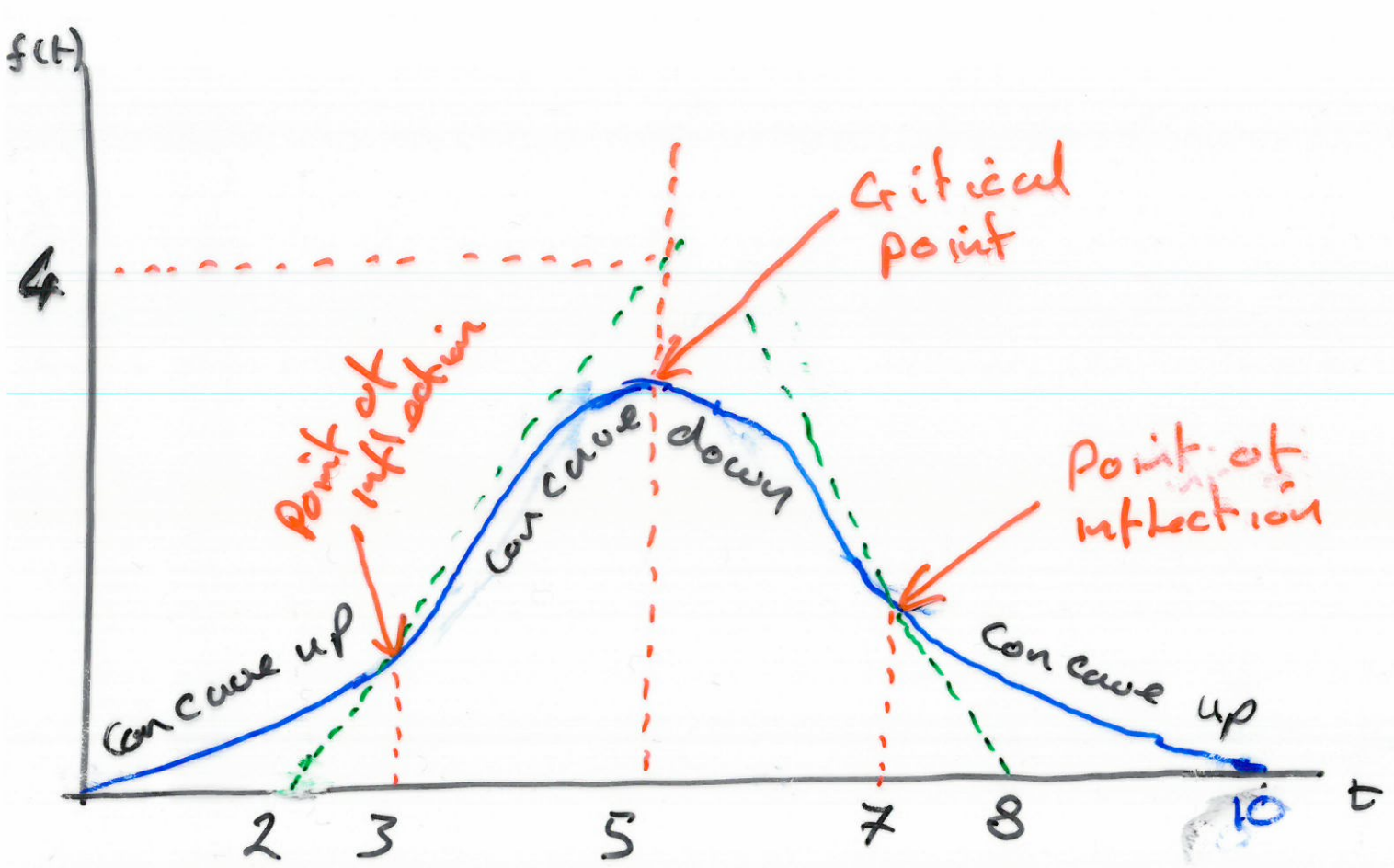
yesterday: derivatives & max/min applications

Today: derivatives & curves

Understanding graphs & functions

A car drives on a long straight track. At time t its distance from the start is $f(t)$.

The graph of $f(t)$ is:



Determine when:

1) speed is positive. Ans: $(0, 5)$

2) speed is negative. Ans: $(5, 10)$

3) car is accelerating. $(0, 3] \cup (7, 10)$

4) car decelerating. $(3, 7)$

5) what is the fastest speed between $t=0$ and $t=5$? $\frac{4}{3}$

Example Sketch the graph of

$$y = x^4 - 4x^3 + 10$$

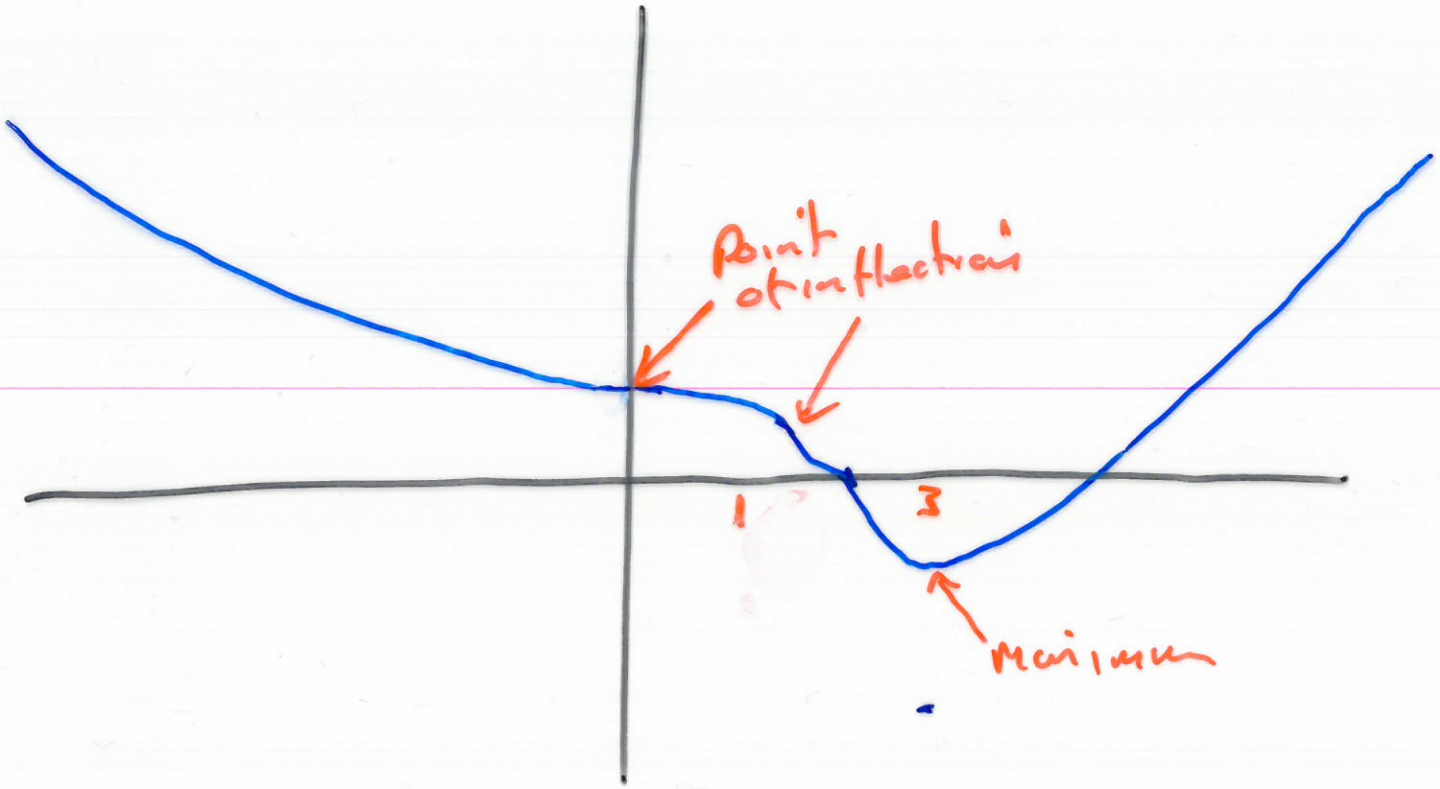
Soln

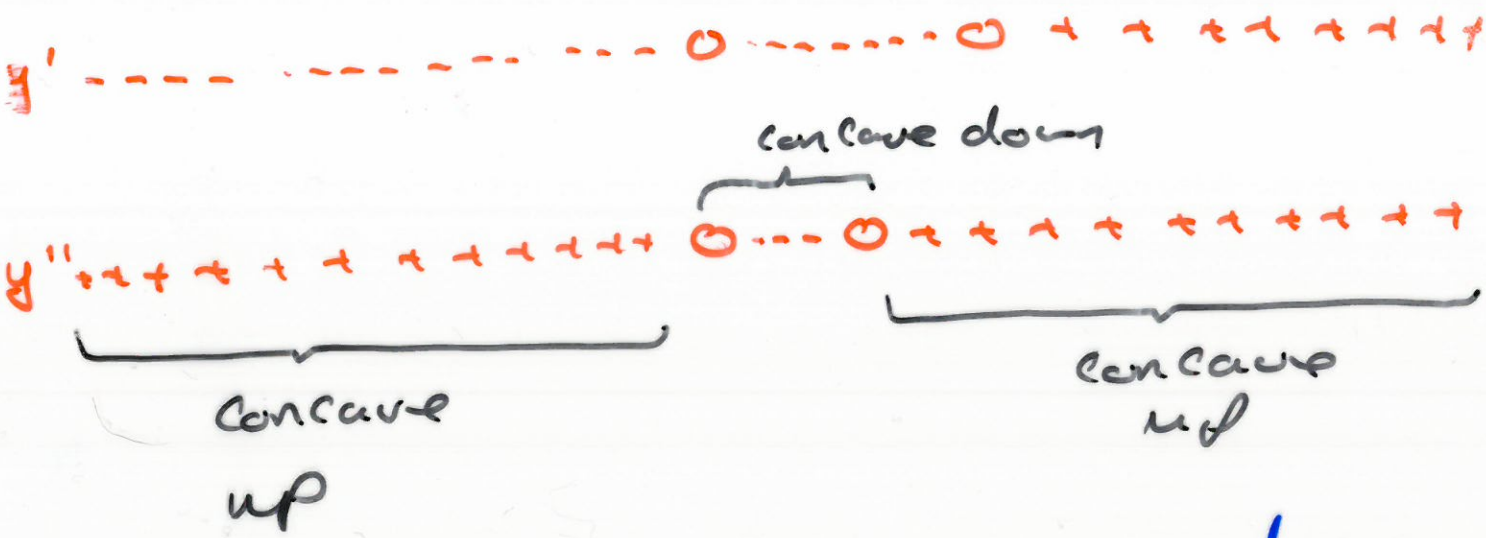
$$y' = 4x^3 - 12x^2 = 4x^2(x-3)$$

$$y'' = 12x^2 - 24x = 12x(x-2)$$

$y'(1) > 0$

$y'(3) < 0$





Defn If $f''(x) < 0$ then concave down

If $f''(x) > 0$ then concave up

Concavity changes at a point of inflection

If $f'(x) = 0$ or $f'(x)$ does not exist then we have a critical point at x.