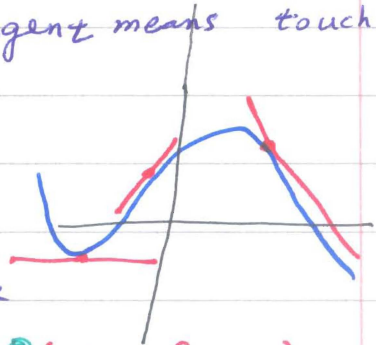


2.1 The tangent and velocity Problems

we cover only Example 1. in the book

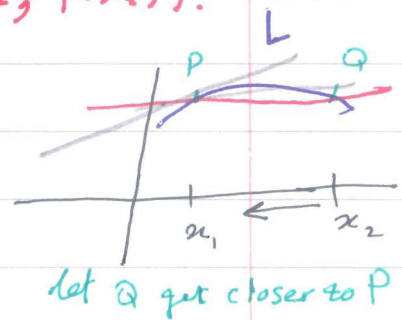
tangent means touching

Geometrically



The slope of the line through the point $P(x_1, f(x_1))$ and $Q(x_2, f(x_2))$.

It is the line L touches the Curve at the point P .



⊙ if the curve is circle the the tangent line and the radius are perpendicular.

Ex. Find the equation of the secant line $[-1, 0]$ then the equation of the tangent line at $(1, 1)$ for $f(x) = x^3$

$$M_{PQ} = \frac{\Delta y}{\Delta x} = \frac{(-1)^3 - 0}{-1 - 0} = 1 \quad \leftarrow \text{the slope of the secant line}$$

Eg: $y = 1(x) = x$

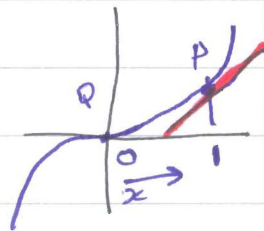
Now let $x \rightarrow 1$ (but $x \neq 1$)

choose $x = 0, 0.25, 0.5, 0.9, 0.99, 0.999$

$x^3 = 0, 0.0156, 0.125, 0.729, 0.97, 0.997$

$$\frac{x_2^3 - x_1^3}{x_2 - x_1} = M_{PQ} = 1, 1.3, 1.75, 2.71, 3, 3$$

$\rightarrow 3$ when $x \rightarrow 1$ and $Q \rightarrow P$.



the slope is 3

Eg: $3 - 0 = 3(x - 1)$