
HOMEWORK DAY 1 – *Tangent and velocity problems (§1.4)*

1. You are given a function f and a point P . Express the slopes of the tangent line to the graph of f at P as a limit of slopes of secant lines. Sketch a graph of the function showing the point P and a generic secant line through P and another point Q . Can you find two different expressions, one as $\lim_{x \rightarrow a}$ another as $\lim_{h \rightarrow 0}$?

(a) $f(x) = x^3$ at $P(1, 1)$

(b) $f(x) = \sqrt{x}$ at $P(4, 2)$

2. The displacement (in meters) of a particle moving in a straight line is given by the equation of motion $s(t) = 1/t^2$, where t is measured in seconds.

(a) Express the velocity of the particle at $t = 2$ as a limit.

(b) Sketch a graph of the function $s(t)$. What does the limit you found represent geometrically?

(c) What are the units of the velocity?

3. §1.4: 2

$$(a) \quad m[0, 40] = \frac{7398 - 3438}{40 - 0} = 99 \frac{\text{steps}}{\text{min}}$$

$$m[10, 20] =$$

4. §1.4: 4. Sketch a graph of the curve and the points P and Q for generic x .