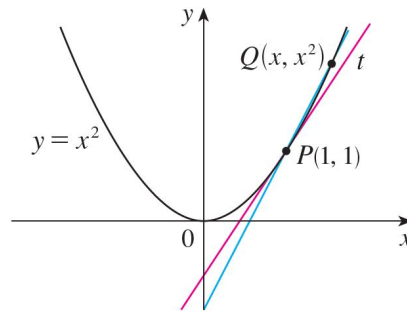


2.1 The tangent and velocity problems

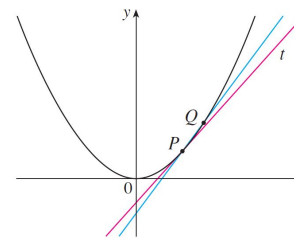
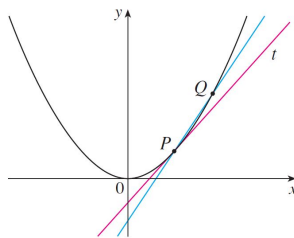
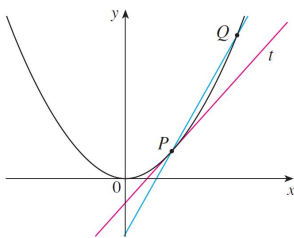
Calculus of variation studies the rate of change of continuous functions. Compare this to a discrete valued function, where it is easier to find the rate of change from one point to another.

Questions in this chapter: What is the rate of change (slop) of a continuous function at a point? What is the slope at every point where the function is continuous? What is the formula for it?

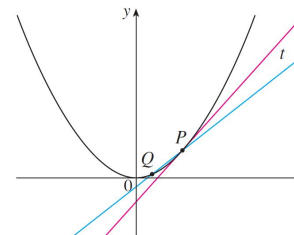
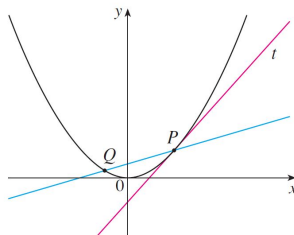
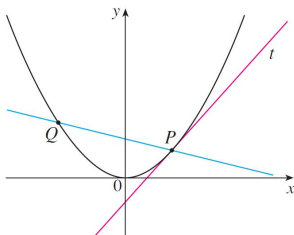
1. the tangent line to a curve at a point P , is the line that has the same slope as the curve at that point P , i.e. the slope of the tangent line and the slope of the curve are the same at that point P



2. the slope of the tangent line can be approximated by choosing two points on the curve. Closer the two points are, better the approximation is. This approximation gives the **average velocity** between the two points.
3. the slope of the curve at the point P gives the rate of change of the curve at that point.
4. if the curve describes the distance of a moving object, then the slope at any particular point will tell the **instantaneous velocity** of the object at that point.



Q approaches P from the right



Q approaches P from the left

