## Geometric definition of the derivative:

We're still trying to find a computational method of finding the equation of the tangent line – how do we compute the value of $m$?

In general, how do we know which lines are tangent lines and which lines are not?

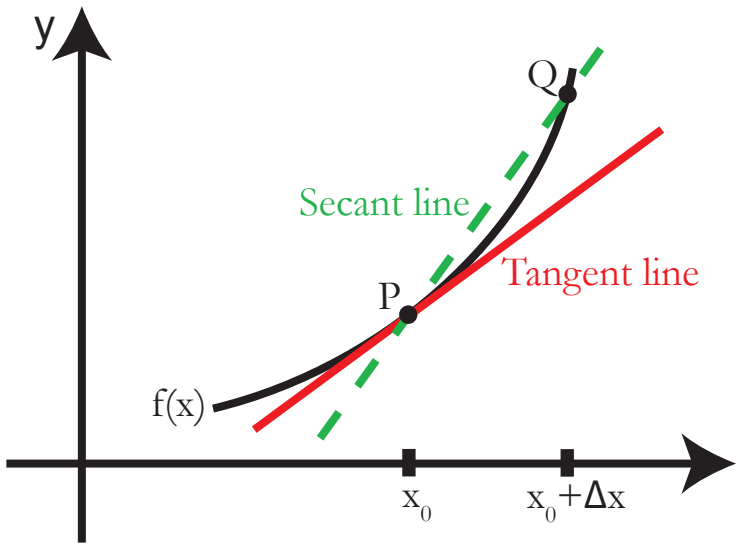


Figure 1: A graph with secant and tangent lines

A *secant* line is a line that joins two points on a curve. If the two points are close enough together, the slope of the secant line is close to the slope of the curve. We want to find the slope of the tangent line $m$ — which equals the slope of the curve — and we use the slopes of secant lines to do this.

Suppose $PQ$ is a secant line of the graph of $f(x)$. We can find the slope of the graph at $P$ by calculating the slope of $PQ$ as $Q$ moves closer and closer to $P$ (and the slope of $PQ$ gets closer and closer to $m$).

The tangent line equals the limit of secant lines $PQ$ as $Q \to P$; here $P$ is fixed and $Q$ varies.

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