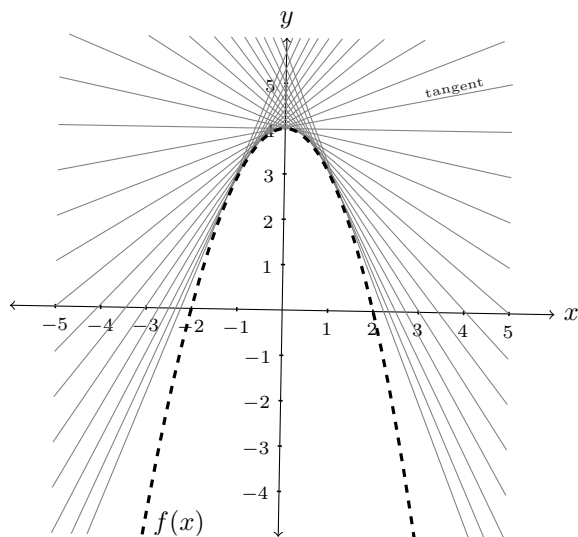


# Handout 8

## Differentiation

### 8.1 What Is Differentiation? (Slope)

The first derivative is an expression for all of the slopes of all of the tangents to the curve.



When you find the first derivative of a function, such as  $f(x)$ , you are finding an expression, in  $x$ , for all of the slopes of all of the ‘tangents’ to the curve,  $f(x)$ .

*Remember, a ‘tangent’ is a straight line that touches a curve at one point only, and stays on one side of that curve, i.e. **not** continuing through to the other side, **not** crossing through it.<sup>i</sup> If the line crosses through it, then it’s called a ‘secant line’.*

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<sup>i</sup>The word ‘curve’, and not ‘function’, is used here, as, for example, the **circle** is not a ‘function’, but it can have tangents touching it. The circle does not pass the ‘vertical line test’ - there would be more than one output so it is not a ‘function’.

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