Section 2.4 The Derivative

# Topic 1: Rate of Change

For , the **average rate of change from  to ** is

 for .

For , the **instantaneous rate of change at ** is

, if the limit exists.



# Topic 2: The Derivative

**Procedure for finding the first derivative** of a function:

1. Find .
2. Find .
3. Find .
4. Find .

# Topic 3: Slope of the Tangent Line

Given  the **slope of the graph** at the point  is given by

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provided the limit exists. In this case, the **tangent line** to the graph is the line through with slope given by .

# Topic 4: Nonexistence of the Derivative

The existence of a derivative at  depends on the existence of a limit at , that is on the existence of****. If the limit does not exist at , we say that the function *f* is **nondifferentiable at ** or  does not exist.