

**Functions and their Derivatives**

**Courses of Functions, Monotony, and Curvature**

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**Intention**

The Aim of this worksheet is o make pupils familiar with the connection between a function and its derivatives. No calculations are needed in order to solve the tasks. Practical experience shows that about 50min are needed to complete the worksheet.

**Background of Subject Matter**

Multiple tasks are aimed at an understanding of the relation between monotony and curvature.

**Methodical Advice**

The pupils should solve the tasks alone or together with a partner. The tasks’ level of difficulty is average.

**Performance Rating**

In an exam, it is easily possible to test if the students have understood the relations and are able to argue their claims through varying the tasks.

**Functions and their Derivatives**

May function f be continuous and differentiable.

**Task 1**

May function f be strictly monotonically decreasing in the interval I. What happens to functional value in the in the interval if the x-value of the function is decreasing? Argue.

**Task 2**

In a right curve, may the function f have the slope 4 in. Which slope will f have in in this right curve, if is located to the right of? Argue.

**Task 3**

May possess the value -5 in. What does this tell you about and in a neighbourhood of ? What can be said about? Argue.

**Task 4**

May intersect the x-axis in from above. Which special point is? Argue.

**Task 5**

If necessary, correct the following argumentation:

In a right curve of a function f the slope of the tangent decreases if moves from left to right. As the derivate of a function describes the slope of the tangent in a particular point, and are strictly monotonically decreasing in the right curve. Argue if you have changed the argumentation.

**Task 6**

If possible, draw a sketch of a section of a function which has a left curve and is strictly monotonically decreasing. What can be said about in this part of the curve? Argue.

**Task 7**

May function change from a right curve into a left curve in. Additionally, may be strictly monotonically increasing close to. Is this possible? Argue with the help of a sketch.

**Task 8**

May function change from a right curve into a left curve in. Additionally, may be strictly monotonically decreasing close to. Is this possible? Argue with the help of a sketch.

**Task 9**

May be monotonically decreasing in an interval and possess an x-intercept in this interval. What can you conclude about in this interval? Argue.

**Task 10**

May be strictly monotonically increasing in an interval I but may possess only negative functional values in this interval. Sketch the course of in the interval and argue your solution.