Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Student number\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Assignment 1**

Use the polar coordinate system representations

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to calculate . Assume that the displacement components  and  are functions of the angle  only. Derivatives of the basis vectors are

 and  .

**Solution template**

Evaluation of a tensor expression consist of (I) substitution of the representations, (II) term-by-term expansion, (III) evaluation of the terms, (IV) simplification and/or restructuring the outcome.

First, substitute the representations



Second, expand



Third, calculate the derivatives by taking into account the known expressions of the basis vector derivatives and assumption that  and  are functions of the angle  only.



Fourth, combine the terms to get

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