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

**Assignment 1 (2p)**

Gauss theorem implies the following integral identity for curved surfaces



















in which . Verify the integral identity in the spherical  coordinate system by considering vector  and half-sphere , , of radius  as . Derivatives of the basis vectors and the mid-surface gradient in the spherical coordinate system are

, , .

**Solution template**

In case of a half-sphere ,  of radius *R* and vector , the quantities in the integral identity take the forms





*θ*











,

,

,

.

When the expressions are substituted there, the left- and right-hand sides of the integral identity simplify to

,

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