**Proof reading of an integration problem**

**Check the following integration steps. Are there any mistakes that lead to the different answers in Method 1 and Method 2?**

**Method 1**

Evaluate .

We have the standard integral: .

, integration by parts.

**Method 2**

Let

Let

It seems that the answer in (1) is different from (2), but in fact they differ by a constant.

We like to show :

Consider

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