HOMEWORK 11

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Project 4.23 (Leibniz's formula). *Consider an operation denoted by $'$ that is applied to symbols such as u, v, w. Assume that the operation $'$ satisfies the following axioms:*

$$(u+v)' = u' + v',$$
$$(uv)' = uv' + u'v,$$
$$(cu)' = cu', \text{ where } c \text{ is a constant}$$

Define $w^{(k)}$ recursively by

(i) $w^{(0)} := w$
(ii) Assuming $w^{(n)}$ defined (where $n \in \mathbb{Z}_{\geq 0}$), define $w^{(n+1)} := (w^{(n)})'$.

Prove:

$$\sum_{m=0}^{k} \binom{k}{m} u^{(m)} v^{(k-m)}.$$

Proof. □

Sources.

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