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1.40)  $\alpha_i(\vec{p}, y)$  is homo. of deg 0 in  $(\vec{p}, y)$ .

Proj's identity:  $\alpha_i = - \frac{\frac{\partial v}{\partial p_i}}{\frac{\partial v}{\partial y}}$

Theorem 17.6: If  $f(\vec{x})$  is homo. of deg.  $k$ , then  $\frac{\partial}{\partial x_i} f(t\vec{x}) = t^{k-1} \frac{\partial f(\vec{x})}{\partial x_i}$ ,  $\forall i$ .

PROOF: Since  $v(\vec{p}, y)$  is homo. of deg. 0 in  $(\vec{p}, y)$ , then  $\frac{\partial}{\partial p_i} v(t\vec{p}, ty) = t^{-1} \frac{\partial}{\partial p_i} v(\vec{p}, y)$

$$\frac{\partial}{\partial y} v(t\vec{p}, ty) = t^{-1} \frac{\partial}{\partial y} v(\vec{p}, y)$$

$$\Rightarrow \alpha_i(t\vec{p}, ty) = - \frac{\frac{\partial}{\partial p_i} v(t\vec{p}, ty)}{\frac{\partial}{\partial y} v(t\vec{p}, ty)} = \frac{t^{-1} \frac{\partial}{\partial p_i} v(\vec{p}, y)}{t^{-1} \frac{\partial}{\partial y} v(\vec{p}, y)}$$

$$= \alpha_i(\vec{p}, y) \quad \underline{\text{QED}}$$