NO.
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$$= \left(\frac{1}{2\pi\sqrt{-1}}\right)^n \int\int\cdots\int_{|z_i|=\epsilon} \frac{\sum g_{i_1\cdots i_n} z_1^{i_1}\cdots z_n^{i_n}\; z_1^{l_1}\cdots z_n^{l_n}}{z_1^{k_1+1}\cdots z_n^{k_n+1}} dz_1\wedge\cdots\wedge dz_n$$

$$= \left(\frac{1}{2\pi\sqrt{-1}}\right)^n \int\cdots\int \sum g_{i_1\cdots i_n} \frac{1}{z_1^{k_1-i_1-l_1+1}\cdots z_n^{k_n-i_n-l_n+1}} dz_1\wedge\cdots\wedge dz_n$$

$= g_{k_1-l_1,\, k_2-l_2, \cdots k_n-l_n}$, since unless $k_i-i_i-l_i+1=1$,

$\int \frac{1}{z_i^{k_i-i_i-l_i+1}} dz_i = 0$. ⌟

Thus, $res_f(g,h)=0$ for all h is equivalent to $g_{i_1\cdots i_n}=0$ for $i_1\le k_1, \cdots i_n \le k_n$, in which case $g\in\{z_1^{k_1+1}, \cdots z_n^{k_n+1}\}$. This proves the local duality theorem in this case.

⊢ $res_f(g,h) = g_{k_1-l_1 \cdots k_n-l_n} = 0$ Since we can choose any $l_1,\cdots l_n \ge 0$, $g_{i_1\cdots i_n}=0$ if $i_i\le k_i$.

$\Rightarrow$ $g(z) = z_1^{k_1+1}\cdots z_n^{k_n+1} \sum g'_{i_1\cdots i_n} z_1^{i_1}\cdots z_n^{i_n} \subset \{z_1^{k_1+1},\cdots z_n^{k_n+1}\}$

$g'_{i_1\cdots i_n} = g_{k_1+i_1+1, \cdots k_n+i_n+1}$ ⌟

Step Two. We will use the transformation law to prove the

Lemma. Let $f_1', f_1, f_2 \cdots f_n \in \mathcal{O}$ and set $f'=(f_1', f_2\cdots f_n)$, $f=(f_1,\cdots,f_n)$. Assume that $f^{-1}(0)=\{0\}=f'^{-1}\{0\}$ and that $f_1'\in\{f_1,\cdots f_n\}$; i.e., $I(f')\subseteq I(f)$. Then, if the residue pairing is nondegenerate for f', it is nondegenerate for f.