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Dimension of a point line configuration
The $k$-plane matroids

Given: A Hypergraph: $(A, B; I)$  
The $k$-plane matroid on $I$ has independent sets $I' \subseteq I$ defined via:

For all $I'' \subseteq I'$, we have

$$|I''| \leq |A(I'')| + k|B(I'')| - k$$
The triangular prism in the 3-plane matroid

\[ v = 6 \]
\[ f = 5 \]
\[ i = 18 \]
\[ v + 3f - 3 = 18 \]

Only trivial lifts with six generic points in the plane.
The triangular prism in the 3-plane matroid

\[ v = 6 \]
\[ f = 3 \]
\[ i = 12 \]
\[ v + 3f - 3 = 12 \]

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The triangular prism in the 3-plane matroid

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\[ f = 3 \]
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The triangular prism lifts iff the points complete to a Desargues configuration.
$\mathcal{M}_2(K_{6,4})$
\text{rank 12}

$\mathcal{M}_2(K_{4,6})$
\text{rank 14}
$\mathcal{M}_2(K_{6,4})$
rank 12

$\mathcal{M}_2(K_{4,6})$
rank 14