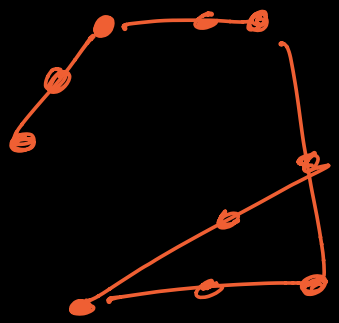
Q: What are the smallest (simple) rank-n matroids with no rank-$(t+1)$ independent flat?



$\geq 2^n - 1$

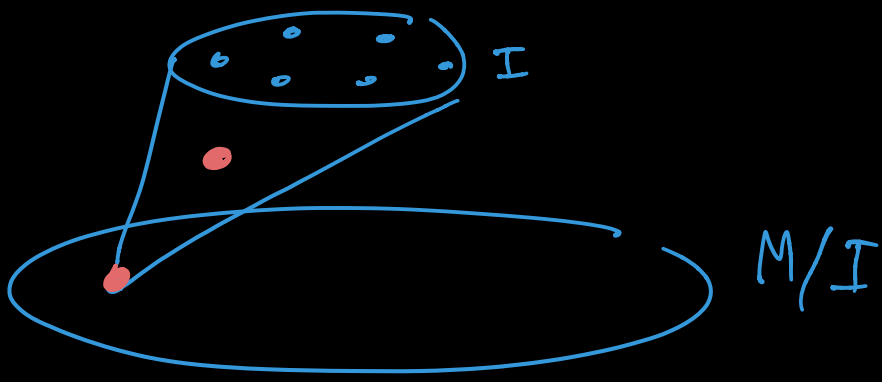
$PG(n-1, 2)$

Thm: If M has no rank-$(t+1)$ ind. flat ($(t+1)$-flat)

then

$|M| \geq$ 

$|M| < |PG(\frac{n}{t} - 1, 2)| \times t + 1$



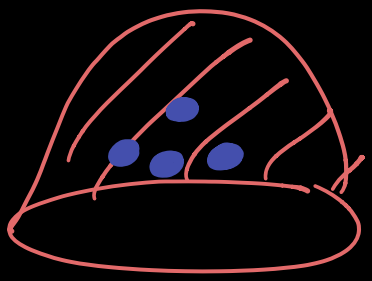
$|M| \geq 2|Si(M/I)| + t$

Q: what if M is Δ-free?
no $(2t+1)$-ind flat

how small can M be?

$t=1$

2^{n-1}



N,N → If M is binary, no I_s (s-element ind flat)

then $|M| \geq$

Conj: If M is (simple) Δ-free, no I_{2t+1}, $t \mid M$

$\Rightarrow |M| \geq t\, 2^{\frac{r(M)}{t}-1}$

$(2t+1)$-element ind flat.