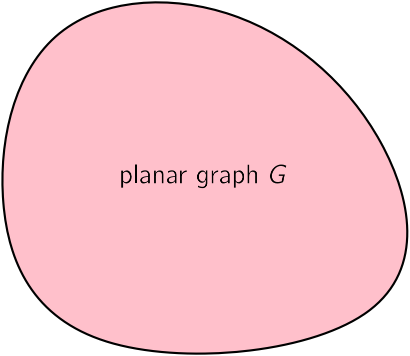
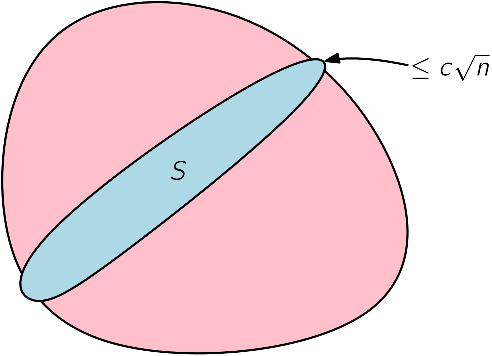
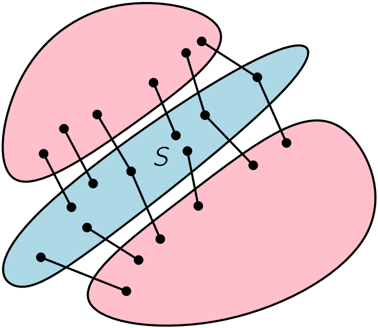

planar graph G


$\leq c\sqrt{n}$
S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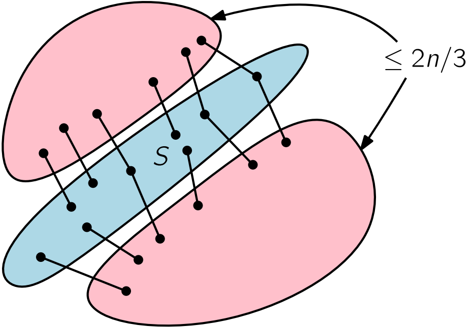
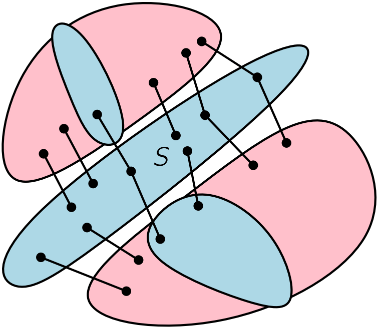

$\leq 2n/3$
S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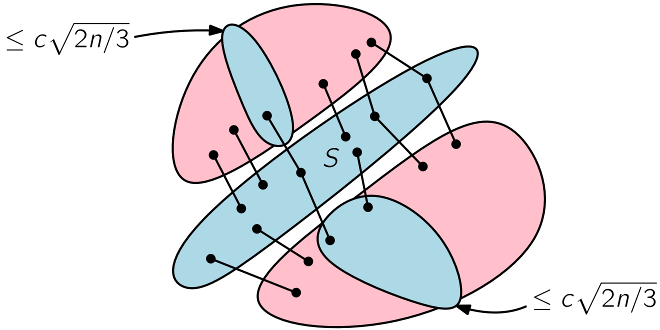
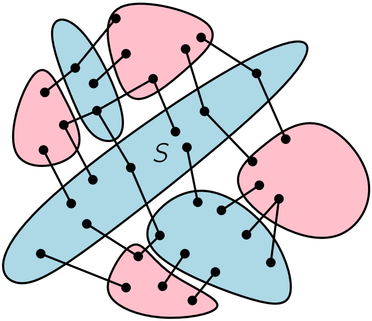
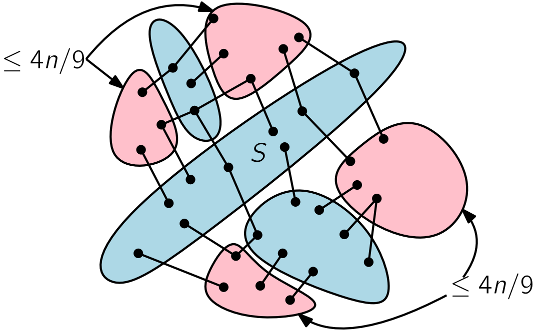
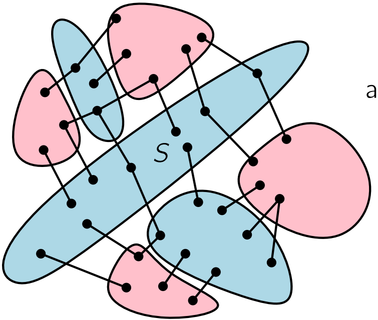

$\leq c\sqrt{2n/3}$
S
$\leq c\sqrt{2n/3}$

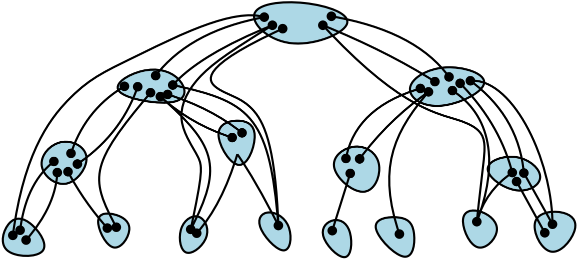

S



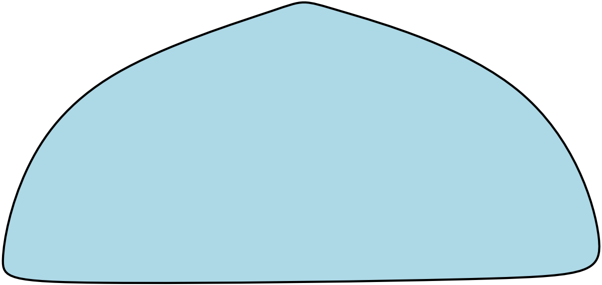
$\leq 4n/9$
S
$\leq 4n/9$



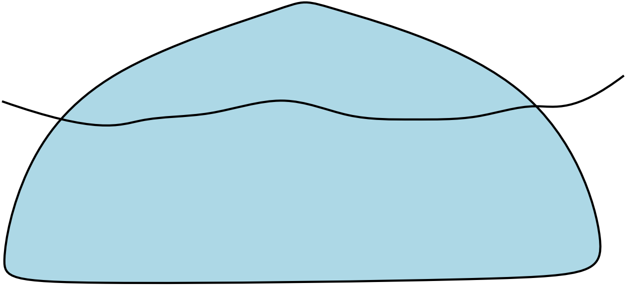
and so on. . .



separator "tree"



separator “tree”



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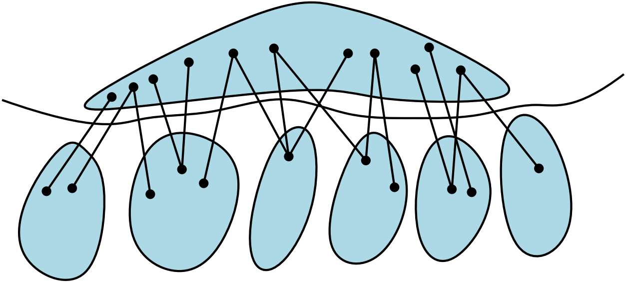
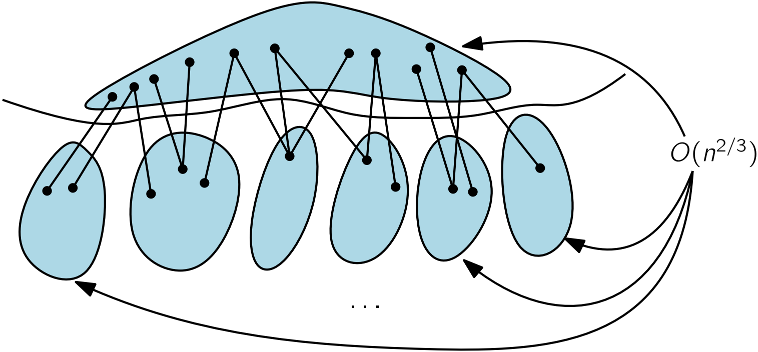
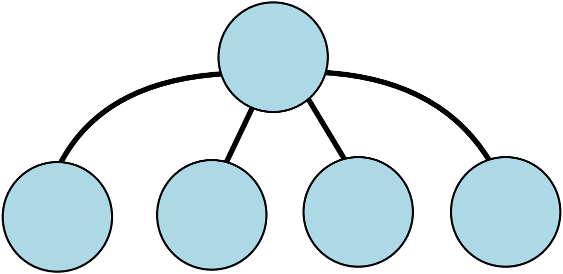
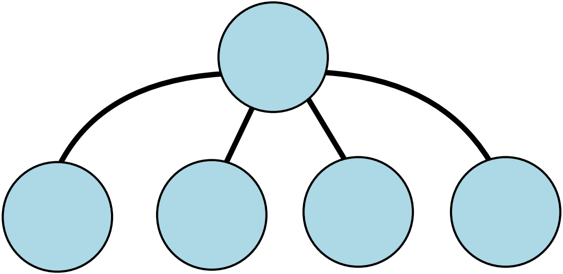


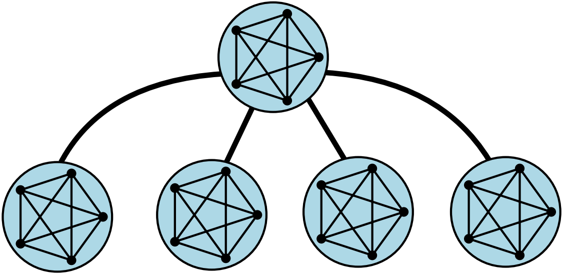


...
$O(n^{2/3})$

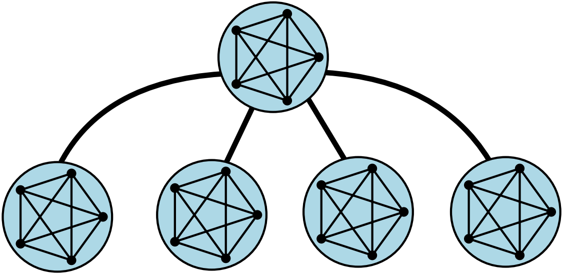




G has a star partition of width $O(n^{2/3})$



$G \subseteq S \boxtimes K_{O(n^{2/3})}$ where S is a star



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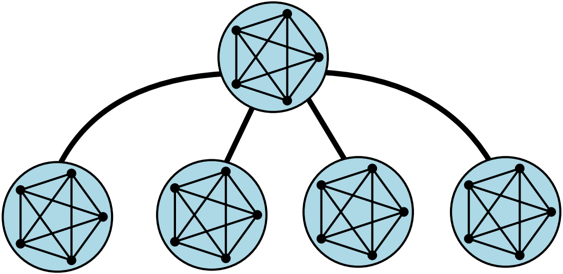

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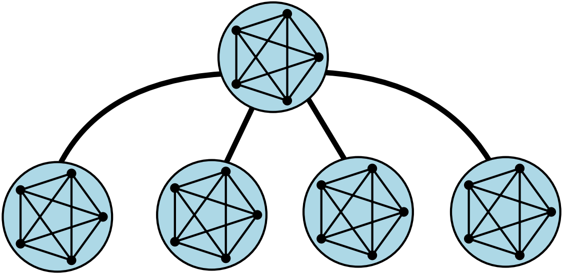
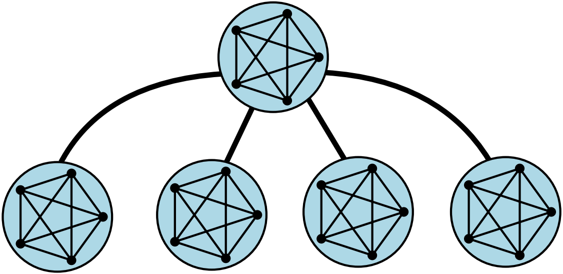
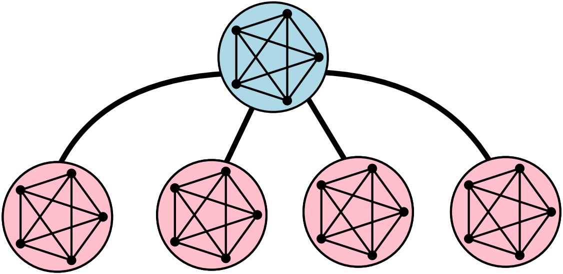


What can we do with parts of size $\tilde{O}(\sqrt{n})$?



Bad News (Linial-Matousek-Sheffet-Tardos 2008): There exists planar G such that every 2-coloring of G has a monochromatic component of size $\Omega(n^{2/3})$



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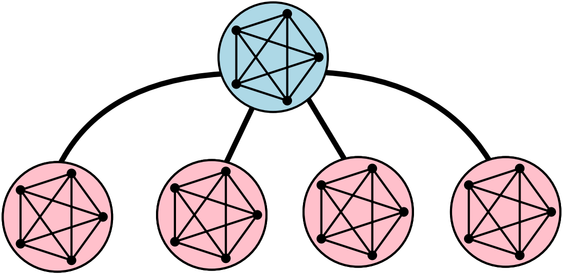
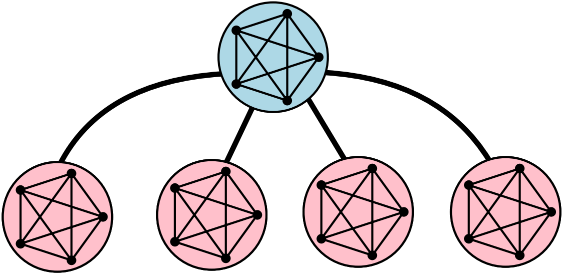


Bad News (Linial-Matousek-Sheffet-Tardos 2008): There exists planar G such that every 2-coloring of G has a monochromatic component of size $\Omega(n^{2/3})$

$G \subseteq H \boxtimes K_{o(n^{2/3})} \Rightarrow H$ is not 2-colorable.



Bad News (Linial-Matousek-Sheffet-Tardos 2008): There exists planar G such that every 2-coloring of G has a monochromatic component of size $\Omega(n^{2/3})$

$G \subseteq H \boxtimes K_{o(n^{2/3})} \Rightarrow H$ is not 2-colorable $\Rightarrow H$ is not a tree.