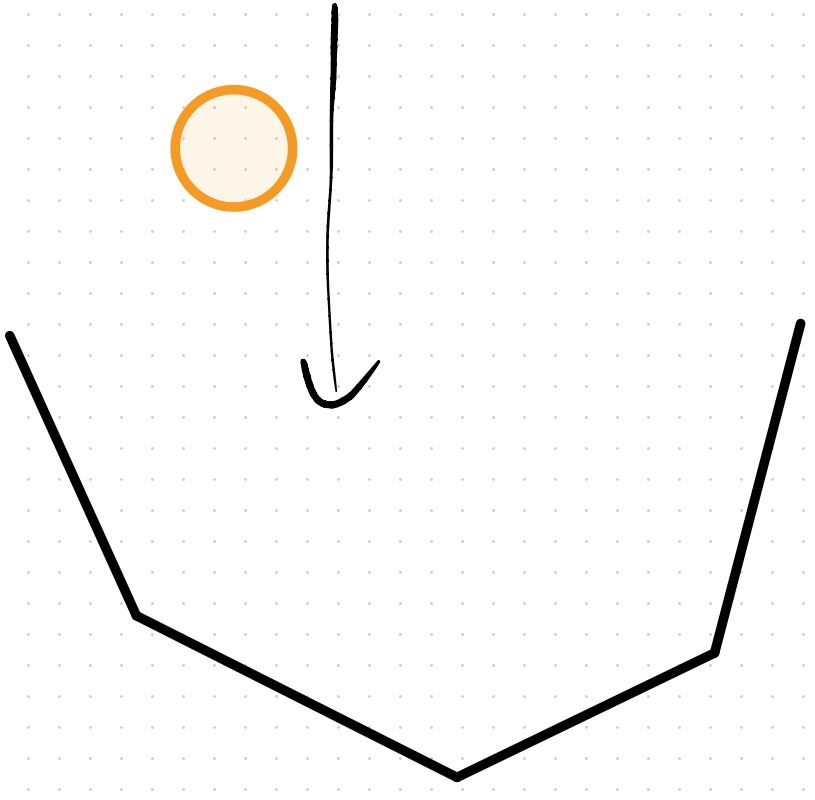
LP Duality



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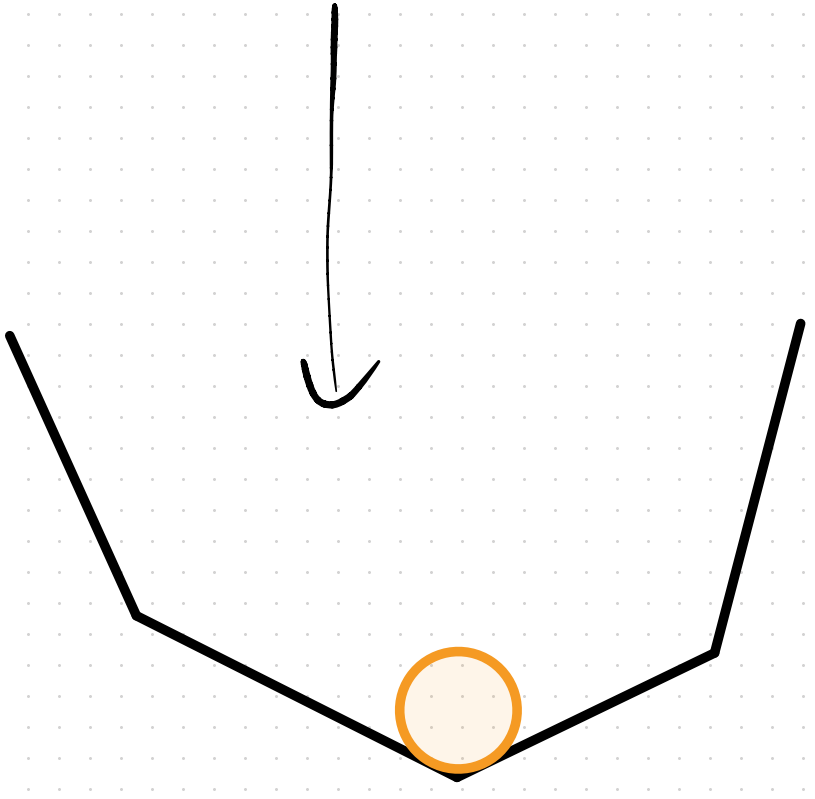
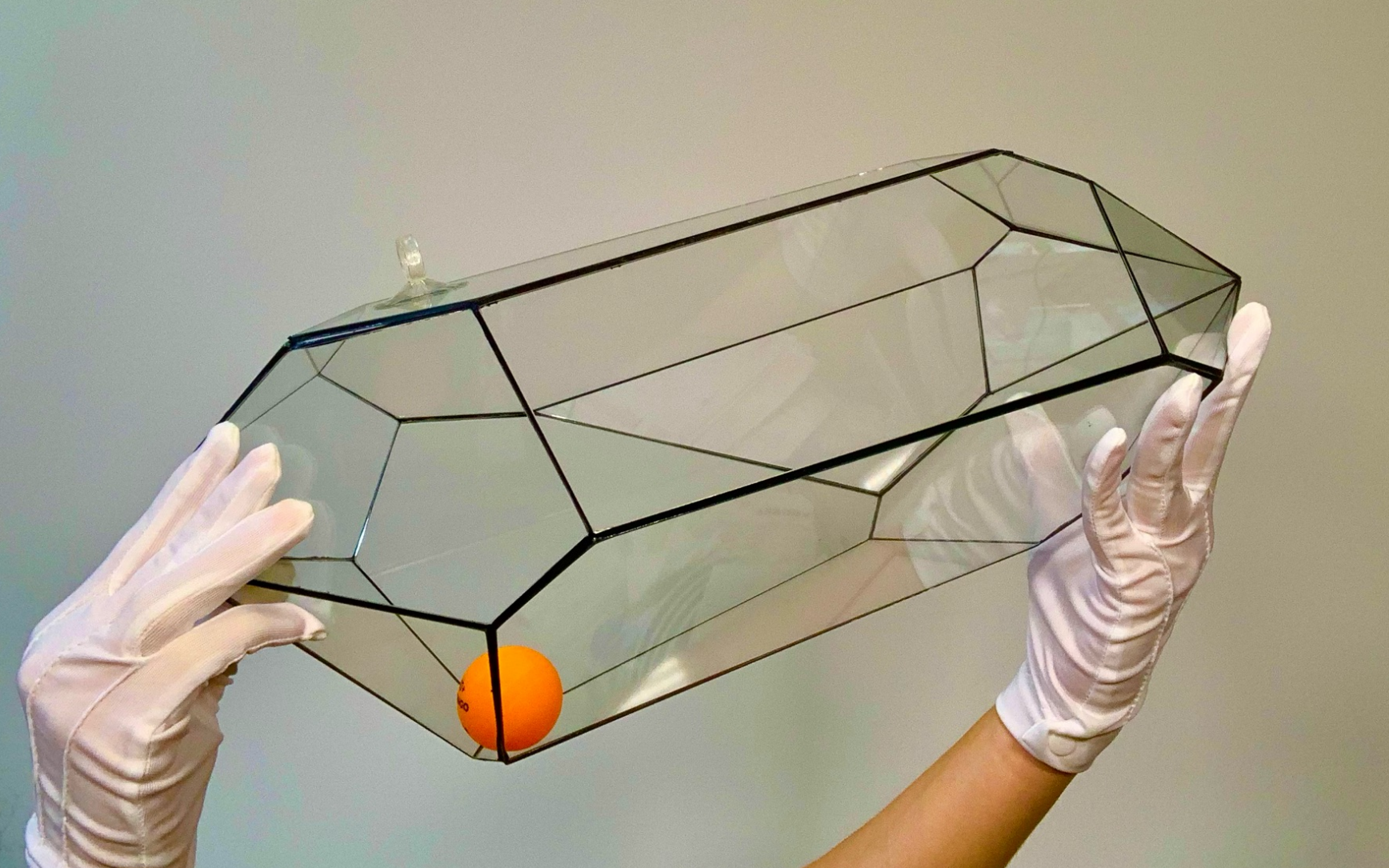
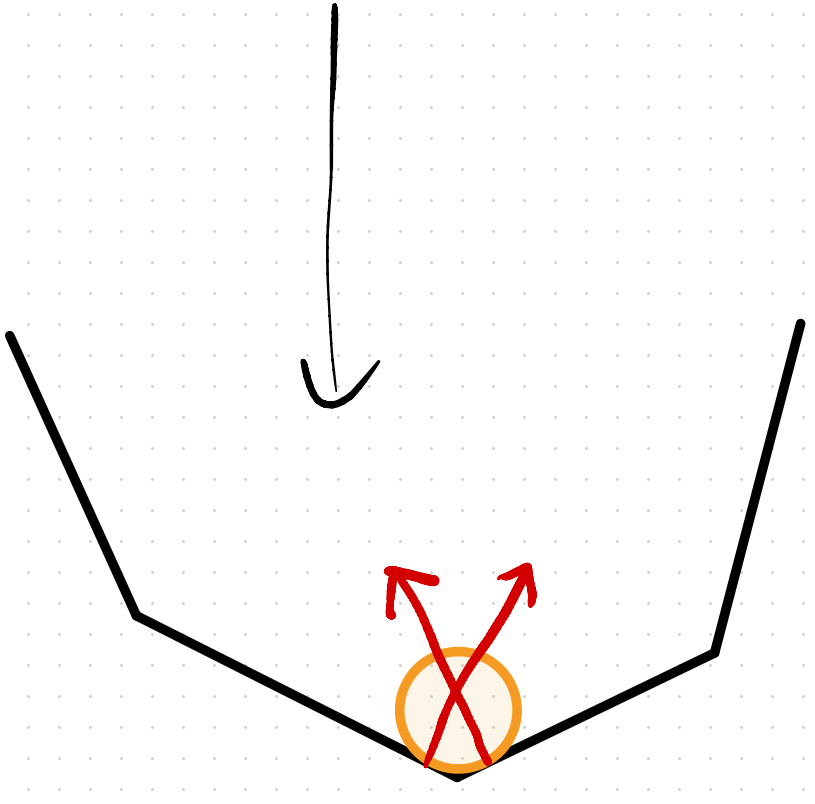




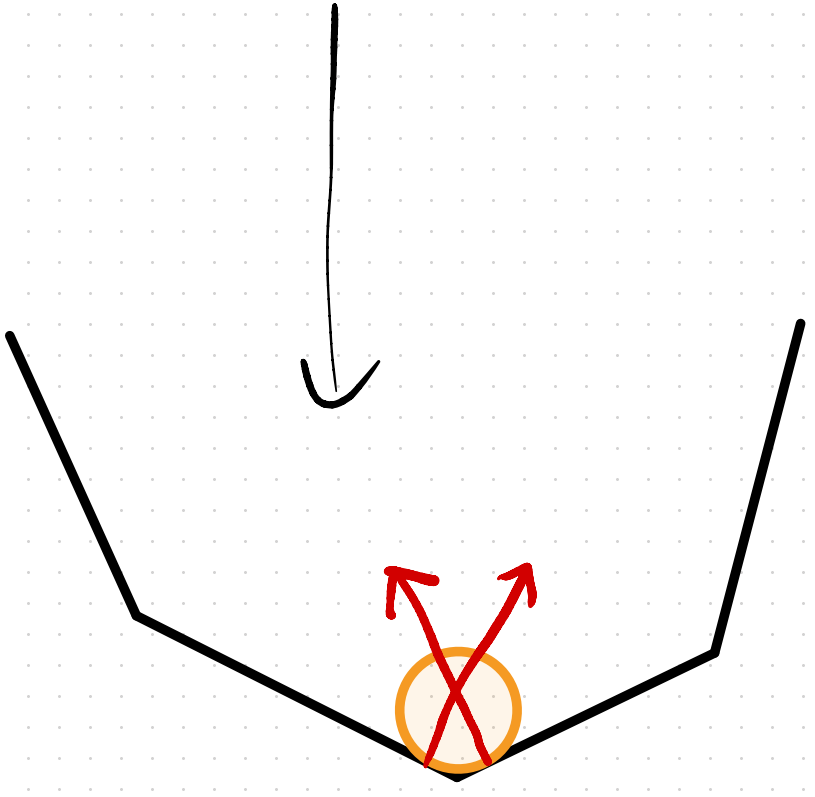
« Every body continues in its state of rest [...] unless it is compelled to change that state by forces impressed upon it. »

Newton 1687

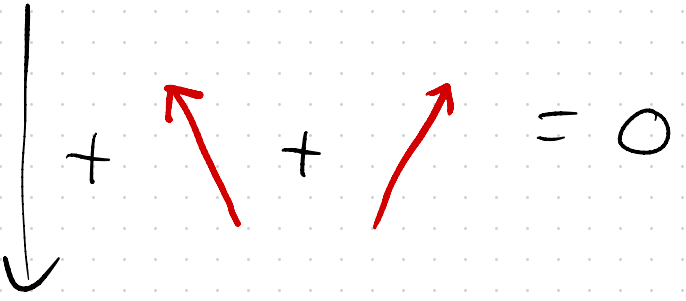
LP Duality



LP Duality



Newton:



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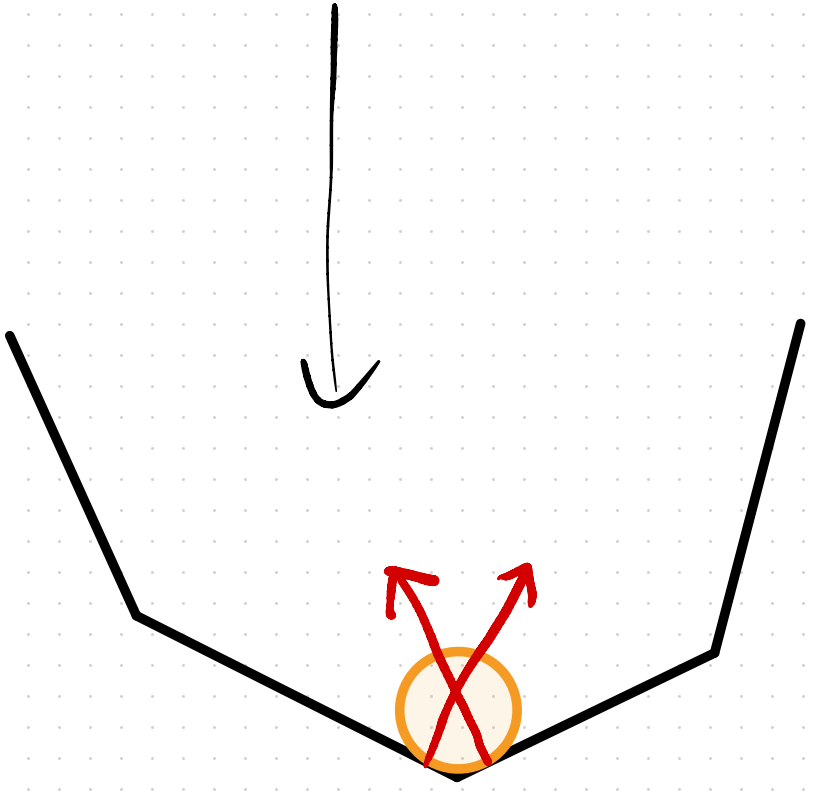
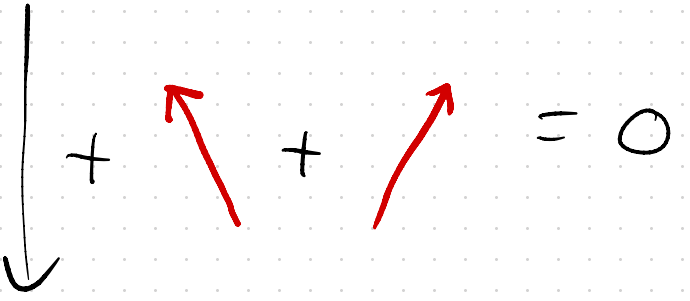


Newton:



The normal forces are multiples of $-A_i$'s, so there is $y^* \geq 0$ with $A^T y^* = c$.

Solving $\max c^T x$ st $Ax \leq b$, Newton gives $y^* \geq 0$, $A^T y^* = c$.

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The ball only experience normal force from facets it touches, so $y_i^* > 0 \Rightarrow A_i x^* = b_i$.

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Any $y \ge 0$ with $A^T y = c$ satisfies
$$c^T x = y^T A x \le y^T b$$

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