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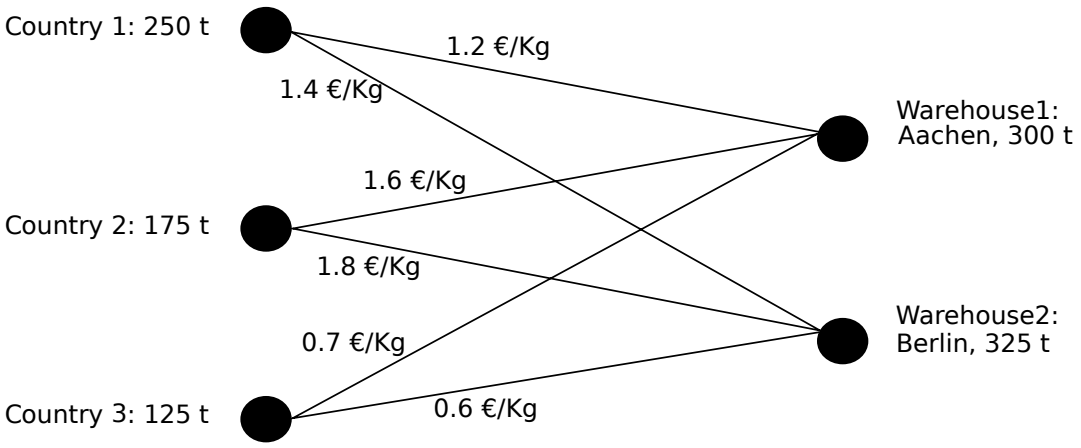
Tutorial 1

Monday, October 19, 2015

Problem 1. (Optimization problem) A German chemical factory has bought 550 tonnes of some raw material for its production for one year. The whole amount of material are purchased from three different countries and must be shipped to two warehouses of the company in Aachen and Berlin.

Considering the fact that shipment costs from each country to each warehouse are different and also each warehouse has a different storage capacity, try to formulate an optimization problem. Solution of this problem must result in successful delivery of the whole material to warehouses, while the overall cost is as low as possible. In the figure below the details of the whole purchase and cargo are shown.



Problem 2. (Convex sets) Fill the following blank spaces with T or F (for true and false, respectively).

a) $\cdots$ Any affine set is convex.

b) $\cdots$ Any convex set is affine.

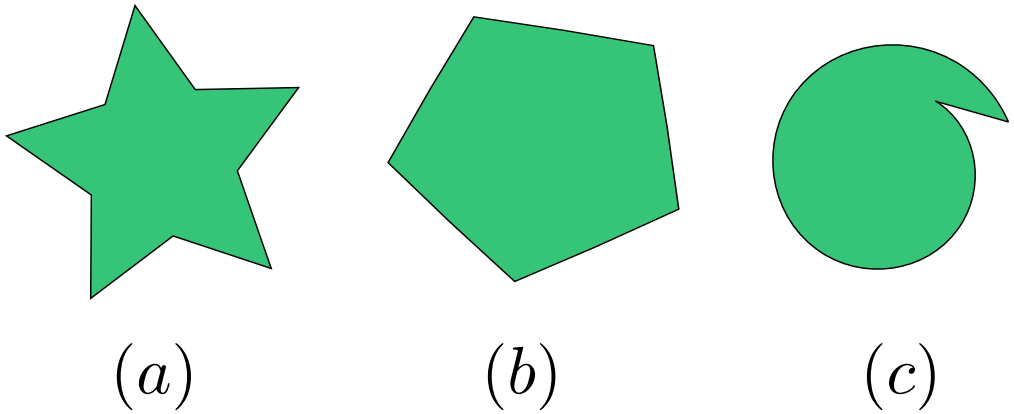
c) $\cdots$ Any affine set is open.

d) $\cdots$ Any open set is affine.

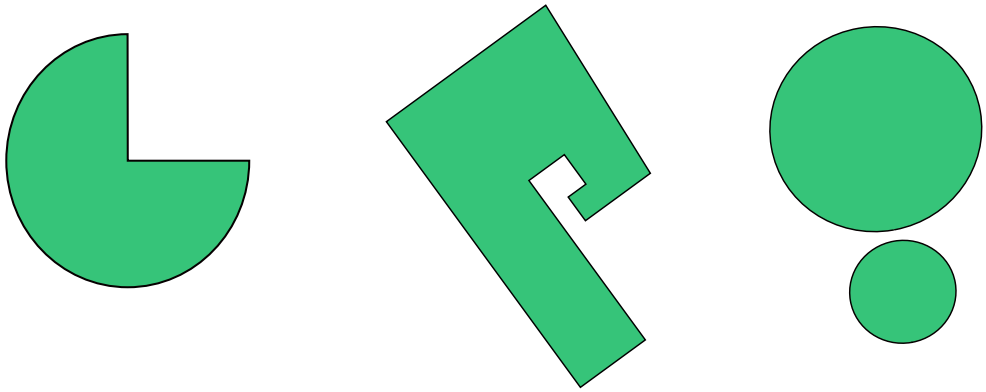
e) $\cdots$ $\mathbb{R}^n$ is the only affine set in $\mathbb{R}^n$.

f) $\cdots$ If $n \geq 1$, there exist infinitely many affine sets in $\mathbb{R}^n$.

Problem 3. (Convex hull) Draw the *convex hull* for all the sets given in the figure.



(a) (b) (c)



(d) (e) (f)