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B.Sc. Part I, Paper

Linear Programming

Convex Set :- Let S be a vector space over the real numbers or over some ordered field. A subset C of S is convex if, for all x and y in C, the line segment connecting x and y is included in C. This means that the affine combination $(1-t)x + ty$ belongs to C, for all x and y in C, and t in the interval $[0,1]$. This emplies that convexity is invariant under affine transformation. This means a convex set in a real or complex topological vector space is path-connected, thus connected.

A set C is strictly convex if every point on the line segment connecting x and y other than the endpoints is inside the interior of C.

A set C is absolutely convex if it is convex and blanced.

The convex subsets of R (the set of real number) are the intervals and the points of R.

Some examples of convex subsets ~~of~~ are solid regular polygons, solid triangles, and intersections of solid triangles etc.

Some examplers of convex subsets of a Euclidean 3-dimensional space are the Archimedean solids and the Platonic solids.

The Kepler-Poinsot Polyhedra are the example of non-convex sets.

Non-convex Set:- A set that not convex is called a non-convex set. A polygon that is not a convex polygon is sometimes called a concave polygon, and some sources more generally use the term concave set to mean a non-convex set, ~~but most~~ ~~auth~~ The complement of a convex set, such as the epigraph of a concave function, is sometimes called a reverse convex set, especially in the context of mathematical optimization.

Properties of convex set:

Given r points $u_1, ---, u_r$ in a convex set S, and r nonnegative numbers $\lambda_1, -- \lambda_r$ such that $\lambda_1 + -- + \lambda_r = 1$, the affine combination $\sum_{K=1}^{r} \lambda_K u_K$ belongs to S. As the definition of a convex set is the case $r=2$, this property characterizes convex sets. Such an affine combination is called a convex combination of $u_1, --, u_r$.

1) The Epty set and the whole space are convex

2) The intersection of any collection of convex sets is convex.

3) The union of a sequence of convex sets is convex, if they form a non-decreasing chain for inclusion. For this property, the restriction to chains is important, as the union of two convex sets need not be convex