

# Ascending Auctions for (Integral Poly)Matroids with Concave Nondecreasing Separable Values

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Consider selling bundles of indivisible goods to buyers with concave utilities that are additively separable in money and goods. We propose an ascending auction for the case when the seller is constrained to sell bundles whose elements form a basis of a matroid. It extends easily to polymatroids. Applications include scheduling (Demange, Gale, and Sotomayor, 1986), allocation of homogeneous goods (Ausubel, 2004), and spatially distributed markets (Babaioff, Nisan, and Pavlov, 2004). Our ascending auction induces buyers to bid truthfully, and returns the economically efficient basis. Unlike other ascending auctions for this environment, ours runs in pseudo-polynomial or polynomial time. Furthermore we prove the impossibility of an ascending auction for nonmatroidal independence set-systems.