

# Approximate Revenue Maximization with Multiple Items

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Myerson's classic result provides a full description of how a seller can maximize revenue when selling a single item. We address the question of revenue maximization in the simplest possible multi-item setting: *two items* and a *single buyer* who has *independently distributed* values for the items, and an additive valuation. In general, the revenue achievable from selling two independent items may be strictly higher than the sum of the revenues obtainable by selling each of them separately. In fact, the structure of optimal (i.e., revenue-maximizing) mechanisms for two items even in this simple setting is not understood.

In this paper we obtain *approximate* revenue optimization results using two simple auctions: that of selling the items *separately*, and that of selling them as a single *bundle*. Our main results (which are of a "direct sum" variety, and apply to any distributions) are as follows. Selling the items separately guarantees at least half the revenue of the optimal auction; for identically distributed items, this becomes at least 73% of the optimal revenue.

For the case of  $k > 2$  items, we show that selling separately guarantees at least a  $c/\log^2 k$  fraction of the optimal revenue; for identically distributed items, the bundling auction yields at least a  $c/\log k$  fraction of the optimal revenue.

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