# 博弈论第六次作业

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[**Title**]:

**In the social choice problem, consider the case which allows the use of "money":**

**For each voter i, suppose its valuation function is $v_i : A \rightarrow R_+$. If the final winner is $a \in A$, the social welfare is $\sum_i v_i(a)$.**

**We want to design a mechanism which maximizes social welfare, and we can ask each voter to pay some money. Use VCG technique to design a truthful mechanism. Your mechanism should include an allocation rule and a payment rule.**

[**答**]: 由题意可知，这是一个多参数机制环境. 对于投票者 $i$，会对每一个 $a \in A$ 给出估值 $v_i(a)$. 同时，在该机制是诚实的设定下，可知对每一位投票者报价时都会给出自己真实的估值, 即 $b = v$.

因此，在社会福利最大化的要求之下，我们定义分配规则 $x$ 为:

$$x(v) = \underset{a \in A}{argmax} \sum_i v_i(a)$$

再由 VCG 机制的定义给出支付规则 $p$ 为:

$$p_i(v) = \underset{a \in A}{max} \sum_{j \neq i} v_j(a) - \sum_{j \neq i} v_j(a*)$$

其中 $a* = x(v)$, 是分配规则得到的结果.