ANOTHER[*] CORRIGENDUM TO "UTILITY THEORY WITHOUT THE COMPLETENESS AXIOM"

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LET $\succsim$ be a transitive partial preference-or-indifference order on R^n that is *additive homogeneous* (if $x \succsim y$, then $x+z \succsim y+z$ and $\alpha x \succsim \alpha y$ for all z and all positive α) and *archimedean* (if $x \succ \alpha y$ for all positive α, then $y \not\succ 0$). A *utility* for $\succsim$ is a linear function u on R^n such that $u(x) > u(y)$ when $x \succ y$ and $u(x) = u(y)$ when $x \sim y$. The set of x in R^n with $x \succ 0$ is a convex cone T whose dual[1] T^* is the set of all utilities for $\succsim$. Aumann (1962, Section 7) asserts that if the dual T^{**} of T^* coincides with T, then "we can recover the order from the set of all utilities." That is incorrect; we can indeed recover the strict preferences, but not the indifferences. For example, on R^2 we may define two orders, one by $x \succsim y$ iff $x_1 > y_1$, another by $x \succsim y$ iff $x_1 \geq y_1$. In both cases, T is the open right half-plane, and $T^{**} = T$; but the orders are different: Two points on the same vertical line are incomparable in the first, indifferent in the second.

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REFERENCES

AUMANN, R. J. (1962): "Utility Theory Without the Completeness Axiom," *Econometrica*, 30, 445–462.
——— (1964): "Utility Theory Without the Completeness Axiom: A Correction," *Econometrica*, 32, 210–212.

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[*]See Aumann (1964).

[1]The set of all u in R^n with $ux > 0$ for all x in T.

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