Internal Coherence

A credence function, recall, is a function that assigns to each proposition a real number between 0 and 1, representing the subject's credence in that proposition.

As I noted earlier, not just any assignment of credences to propositions is internally coherent. What does it take for a credence function to count as internally coherent?

A standard answer is that it is internally coherent if and only if it is a **probability function**.

A probability function, $p(\ldots)$, is an assignment of real numbers between 0 and 1 to propositions that satisfies the following two coherence conditions:

Necessity
If A is a necessary truth, then $p(A) = 1$.

Additivity
If A and B are incompatible propositions, then $p(A \text{ or } B) \ = \ p(A) + p(B)$.

Problem 1

1/1 point (ungraded)
True or false?

$p(\text{not-}A) = 1 - p(A)$, for any proposition A.

- [x] True
- [ ] False

✓

Explanation

Since it is necessarily true that A or not-A, Necessity tells us that $p\,(A \text{ or not-}A) = 1$. Since A and not-A are incompatible with one another, Additivity tells us that

$$p\,(A \text{ or not-}A) = p\,(A) + p\,(\text{not-}A)$$

Putting the two together:

$$p\,(A) + p\,(\text{not-}A) = 1$$

So:

$$p\,(\text{not-}A) = 1 - p\,(A)$$

And, of course, if $p\,(\text{not-}A) = 1 - p\,(A)$, p(Rain) and p(no Rain) can't both be 0.9.

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Problem 2

1/1 point (ungraded)

If p is a probability function, then $p\,(A) \geq p\,(AB)$, where "AB" is short for "A and B".

True or false?

- (selected) True
- False

✔

Explanation

Since A is equivalent to (AB)-or-$(A\,\text{not-}B)$, and since (AB) and $(A\,\text{not-}B)$ are incompatible, Additivity gives us:

$$p\,(A) = p\,(AB) + p\,(A\,\text{not-}B)$$

But since $p\,(A\,\text{not-}B)$ must be a real number between 0 and 1, this means that

$$p\,(A) \geq p\,(AB)$$

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? Don't we need a completeness condition for the definition of Internal Coherence?
I guess we are going to need a completeness condition if we want to define internal coherence
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