

DMUU1 2026 Week 2 Answer key

Q1. What is the same about the two removals, and what is different about why each field did it?

- 1- The same: both fields stopped defining things by feelings and started defining them by what you can observe.
 - a. In economics, Samuelson's revealed preference says you don't measure how much someone wants something. You just watch what they choose. If they consistently pick A over B, that *is* the preference.
 - b. In psychology, Skinner does the same thing with reward. Something counts as a reinforcer if it makes a behavior happen more often. You never have to ask whether the animal enjoyed it.
 - c. Both moves keep the predictions and drop the claim to have measured a feeling.

Both were set up by an earlier step.

Pareto had already shown in 1906 that you don't need cardinal utility, only rankings. Thorndike had already reduced "satisfaction" to an observed pattern.

Neither field cites the other.
- 2- What's different is the reason.
 - a. Economics dropped mental states because they were **unnecessary**. Hicks and Allen showed the theory worked fine without them. Samuelson showed observed choices alone were enough. So the assumption was extra baggage, and they cut it.
 - b. Psychology dropped them because they were **unreliable**. Thorndike was reacting against stories about clever animals that nobody could check. Behaviourism more broadly was reacting against introspection, which gave different results in different labs and can't be used on animals at all.
 - c. One more difference worth stating. Samuelson never said people have no feelings. He said the maths doesn't need them. Skinner said something stronger: internal states shouldn't be part of scientific explanation at all. Economics took mental states out of its equations. Behaviourism took them out of the vocabulary.

Q2. Why would the same formula show up twice, in two fields that weren't reading each other?

Because the problem itself pushes you toward it.

Suppose you have to compare options, and you're not sure what each one will give you. You need three things. A term for how likely each outcome is. A term for how good it would be. And a rule for combining them into one number you can compare.

Multiplication is the obvious rule. If something can't happen, it should count for nothing. If something is worth nothing, it should count for nothing. If you double either term, the contribution should double. Multiplication does all three. So two people facing the same problem will often land on the same shape without ever meeting.

It also helps that the idea of an "expectation" was already old and widely shared. It runs from Pascal and Huygens through Bernoulli. By the twentieth century it was part of the general toolkit in any quantitative field.

But be careful about what the match proves. The two formulas look the same and mean different things.

In von Neumann and Morgenstern, probability and value are independent. The odds of winning tell you nothing about how much the prize is worth.

In Atkinson, they're linked, and in opposite directions. The harder a task is, the less likely you are to succeed, but the more it's worth succeeding at. Multiply two terms that move opposite ways and the product is highest in the middle. That's exactly the puzzle Atkinson built the theory for: why people pick tasks of moderate difficulty.

Same algebra. Different content.

Q3. Do mental states move in one direction over time?

No. They go back and forth. And the different positions overlap rather than replacing each other.

Here's the pattern:

- **Bentham (1789)** — mental states are the whole foundation.
- **Fechner (1860)** — still the subject, but now measured in experiments instead of just asserted.
- **Thorndike and Skinner (1898–1938)** — taken out.

- **Lewin (1935)** — building valence, an openly subjective quantity, *at the same time* Skinner is building the operant chamber.
- **Hull (1943)** — lets an internal state back in, but only if it's pinned to measurable inputs and outputs.
- **Tolman and Atkinson (1932–57)** — expectation comes back as a formal quantity.
- **Maslow (1943)** — sideways to the whole debate. His question is whether there's one scale of value at all.

The Lewin–Skinner overlap is the clearest evidence this isn't a straight line. They're contemporaries, not successive stages.

So what does that mean for Samuelson? His removal looks like one instance of a recurring pattern, not a final answer.

The pattern seems to be about measurement. Internal states get thrown out when nobody can measure them. They come back when a new method makes them measurable. That's Fechner's move, not Bentham's and not Skinner's.

Behavioural economics brought psychological constructs back on exactly those grounds. Neuroeconomics is doing it again, this time with brain measurement — and doing it under rules that look a lot like Hull's intervening variable. The fact that this course exists is itself the evidence.

Q4. Contrast Hull and Maslow.

Hull lets an unobservable state into his theory, but makes it pay for entry. Drive is defined only by things you can measure: hours since the animal last ate on one side, how fast and hard it responds on the other. Nothing else is allowed to define it. It then goes into a formula where response strength is $\text{drive} \times \text{habit strength} \times \text{incentive}$.

Maslow lets internal states in with no such restriction. His needs aren't tied to measurable inputs, and his evidence is clinical and observational — case studies of people he thought were functioning well, not controlled experiments.

But the deepest difference isn't about method. It's about whether there's one scale.

Hull keeps a single quantity that goes up and down. Behaviour is explained by how *much* drive there is. Maslow says there is no single quantity. What motivates you depends on *which* need is unmet, and the needs aren't interchangeable.

Put simply: Hull kept the internal state and gave up its richness to keep it measurable. Maslow kept the richness and gave up the measurement.

Q5. What does it mean that no one paper covers both histories?

"Fields are siloed" is true but too easy. The useful answer names *how* the silo works.

Nobody publishes it. Journals, reviewers, hiring committees and funders all sit inside one discipline. A history that's half economics and half psychology has no obvious home and no natural audience.

The words don't match. The same idea is called utility, valence, incentive value, or reward depending on where you're standing. You can't search for a parallel when the two sides don't share a keyword.

The teaching reproduces the split. Economists learn Bernoulli → Pareto → Samuelson. Psychologists learn Thorndike → Skinner → Tolman. Neither reading list contains the other. So the people best placed to spot the parallel are trained not to see it.

Method becomes identity. Market data and lab manipulation look like they have nothing to do with each other, even when the question underneath is the same.

You can see the cost in these two documents. A logarithmic value function was found twice, 122 years apart. A probability-times-value formula was found twice, thirteen years apart.

That said, don't conclude that specialisation is just a mistake. It buys depth, shared standards, and the ability to build on each other's work. Fields like neuroeconomics exist to pay a specific cost that specialisation creates — not to prove specialisation was wrong.