Problem 1
Suppose that Heather had the following RD-VNM preferences over mugs and wealth:

\[ u(m, w; r_m, r_w) \equiv 5m + w + 5\mu(m - r_m) + \mu(w - r_w), \]

where \( \mu(x) = \eta x \) if \( x \geq 0 \) and \( \mu(x) = \lambda \eta x \) if \( x \leq 0 \), where \( \eta > 0 \) and \( \lambda \geq 1 \) are parameters, and where \( m, w, r_m, r_w \) are the consumption levels and endowment/status-quo levels of mugs and wealth.

a. Briefly interpret these preferences.

b. Let \( \eta = 1 \) and \( \lambda = 3 \). Draw indifference curve maps for Heather when she is endowed with \((m, w) = (2, 2)\) and \((1, 3)\), respectively.

c. How much will Heather be willing to pay for a mug? Solve for her buying price \( P_B \) as a function of \( \eta \) and \( \lambda \).

d. For how much will Heather be willing to sell a mug that she owns? Solve for her selling price \( P_S \) as a function of \( \eta \) and \( \lambda \).

e. What is the least amount of money that Heather would be willing to accept rather than get a mug? Solve for her “choosing price” \( P_C \) as a function of \( \eta \) and \( \lambda \).

f. Compare these three prices and discuss with subtlety and insight how they relate to the literature on loss aversion and the endowment effect. What does the ratio \( P_S/P_B \) correspond to? How does changing \( \eta \) or \( \lambda \) affect \( P_S/P_B \) and \( P_C/P_B \)? What are the limits of these two ratios as \( \lambda, \eta \) respectively head towards 0 and \( \infty \)?

Problem 2
Suppose Kory is going to live for two periods. His lifetime utility is the sum of his period 1 and 2 utility,

\[ \ln(1 + c_1 - r_1) + \ln(1 + c_2 + r_2). \]

His budget constraint is \( c_1 + c_2 \leq \). He is born with a fixed \( r_1 \in [0, 1] \), \( r_2 \) is determined by \( r_2 = \gamma c_1 + (1 - \gamma) r_1 \), where \( \gamma \in [0, 1] \) is a parameter.

a. Briefly interpret these preferences. How do each period’s preferences compare to the reference-dependent preferences we’ve been studying? Comment on one or two unrealistic aspects of these preferences.

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1. The general format of problem-set questions in the class will be as follows. I’ll introduce the details of the model and ask you to comment on it. You do some math to solve the model and/or make some predictions. I then ask you to comment on what your findings. My interest is not so much in whether you can solve the problem/do the math, rather whether you can see what important and interesting insights can be gained from it. So apart from checking your answers/algebra, I’ll mostly be looking at this last part. Some of the predictions will be standard, some novel. Instead of listing every comparative static, I’d like you to focus on what you think is interesting/new and be able to identify how it depends upon the assumptions we’ve made.
b Solve for Kory’s optimal consumption profile \((c_1^*, c_2^*)\), as a function of \(r_1\) and \(\gamma\).

c Interpret. This includes commenting on the predicted values when \(\gamma = 0\) and \(\gamma = 1\), and the comparative statics. When is \(c_1^* > c_2^*\)?

**Problem 3**

Suppose people are told about the contents of two urns:
Urn 1 contains 100 balls, some of which are red and some of which are black.
Urn 2 contains 100 balls, of which 50 are red and 50 are black.

Now suppose that people are face two choice situations, one of which will be chosen at randomly to actually be played. They first choose of the two urns, and then possibly receive $100, depending on the color of a ball randomly drawn from the urn.

Situation A: choose one of the following gambles:
\(a_1\): Ball from Urn 1, $100 if red, $0 if black
\(a_2\): Ball from Urn 2, $100 if red, $0 if black

Situation B: choose one of the following gambles:
\(b_1\): Ball from Urn 1, $100 if black, $0 if red
\(b_2\): Ball from Urn 2, $100 if black, $0 if red

Experimental evidence indicates that many people prefer both \(a_2\) over \(a_1\), but \(b_2\) to \(b_1\). Assuming such preferences are strict, show that they do not obey any utility function (needn’t be expected utility) defined on lotteries that depends only on the person’s perceived probability of getting $100 and is monotonically increasing in that probability.

**Problem 4**

Malia is deciding what share of her budget, \(b = 1\), to give to Sasha. Malia’s other-regarding utility function is
\[
u_m(\pi_m, \pi_s) = \pi_m + \alpha \pi_s + z(\pi_m - r_m) + z(\pi_m - r_m),
\]
where \(\pi_m\) is the amount of money allocated to Malia, \(\pi_s\) is the amount of money allocated to Sasha, \(r = (r_m, r_s)\) is the reference point, \(\lambda > 1\) is a coefficient of loss aversion, and \(z(x)\) is a gain/loss value function equal to \(y\) when \(y \geq 0\) and \(\lambda y\) otherwise. The parameter \(r_s\) reflects Malia’s beliefs about Sasha’s expectations about how much money she will receive.

a Characterize the set of personal equilibria when both players expect Malia to share a positive amount, \(r_j > 0\). How does the set of equilibria depend upon \(\alpha\) and \(\lambda\)?

b What is/are the PPE?

c Suppose Malia makes up her mind in advance and surprises Sasha. Any money Sasha receives will be a surprise to Sasha and experienced as a gain. However, Malia knows in advance how much she will give herself, so she will not experience any gain/loss utility. What is the optimal amount of money to give to Sasha?