Question 1

Consider the following excerpt: "*Just as Kuhn was writing this, economics was finally settling into what looked like a scientific paradigm, in which mathematical models built around rational agents trying to maximize something called utility were presumed capable of answering all the questions that needed to be answered. Financial economics adopted its own, narrower paradigm, in which the starting point was that the prices prevailing on financial markets were more or less correct (a belief that in those days went under the name Efficient Market Hypothesis, although the EMH is for the most part understood to mean something much narrower now).*"

Rational expectations, along with microfoundations, are still considered as the key conceptual building-blocks of modern macroeconomic modelling. Please discuss these notions, along with the Lucas critique, and how the latter has challenged macro-econometrics along the paths of causality and identification.

Points to be included in answer:

The Rational expectations hypothesis (REH) has been popularized by John Muth, prior to be introduced into macroeconomic theory by Lucas and developed further by Sargent in the early '70s. Until the RE revolution it was conventionally accepted that the expected future value of a given economic variable should only depend on its past history (i.e., the notion of backward looking expectations). By contrast, according to the REH in reality economic agents produce forward-looking expectations, using all the available information when making their decisions and considering the true structure/model of the economy. This implies that people also form expectations about possible policy shifts. This feature of economic forecasting explicitly addresses the Lucas critique, according to which an econometric macro model featuring backward-looking expectations and estimated under an existing economic policy regime, cannot be used to predict economic behavior under a new policy regime. To address this problem Lucas suggests that, along with RE, macroeconomics models should feature explicit microfoundations capable of delivering aggregate behavioral rules as functions of government policy and "deep" parameters (i.e., independent of policy setting) for preferences and technology. From an econometric viewpoint, the Lucas Critique has challenged existing models as a basis for evaluating policy changes along two paths:

1. Causality: Existing models are useless for evaluating prospective changes in policy, as they cannot capture true causal structure*;*
2. Identification: Existing models are not accurate representations of even the current structure of the economy. As such they are not econometrically identified.

Causality is strictly connected with the following problem: how can we infer from the data what the underlying causal relations are? In this context, securing the invariance property is of crucial

importance**:** If models are invariant to policy changes, then we might infer that the relationships we observe represent true causal structure of the economy. However, a major limitation to invariance is that a number of important factors in true causal structure are unobserved, such as expectations and preferences. As for identification, it is important to acknowledge that economic theory formulates ideas on relationships that are not necessarily observable, while what we do observe in the data are the final outcomes of the interaction among the unobservables. In this context, it is necessary to impose restrictions on econometric equations to obtain structural parameters. Such a strongly aprioristic view is based on the dominance of economic theory. In alternative to strong apriorism, one could resort to more flexible approaches that do not rely on the "strong" assumption that a given model embodies the true causal structure of the phenomenon under scrutiny. To this end, two methodologies can be considered: weak apriorism and econometrics as observation. Weak apriorism is based on the assumption that theory and empirical results are interrelated, so that theory should provide some gives a priori restrictions on empirical investigation, while empirics should spur theory development. Therefore, as opposed to strong apriorism, weak apriorism recognizes the mutual interplay between empirical investigation and theory. Pursuing an econometrics as observation approach consists instead of looking at confluent relations that emerge as a consequence of an unknown data-generating process. In this case, theory's role is to explain those observations and, ideally, also be generalizable to all observations.

See Lecture 10 and, for a more detailed discussion, refer to "Econometrics as Observation: The Lucas Critique and the Nature of Econometric Inference" by Kevin D. Hoover in The Philosophy of Economics An Anthology by Daniel M. Hausman.

Question 2:

a) The "standard paradigm" of a rational self-interested utility maximizer that is mentioned in the article has also been frequently criticized in the field of Behavioral Economics.

   - Please sketch the three most important types / categories of deviations from the paradigm that have been documented in Behavioral Economics research.
   - For one of the categories, provide an example of an empirical finding that is inconsistent with the standard paradigm. Describe how the finding was obtained, explain why it is inconsistent with the standard paradigm, and sketch an alternative theoretical idea that can help us understand the finding.

b) Many deviations from the standard economic paradigm have first been documented in laboratory experiments. A frequent criticism against this approach is that the findings from these experiments might not generalize to the real world since the laboratory setting involves a number of unrealistic features. Is this a serious concern from a Philosophy of Science perspective? Explain.

Points to be included in answer:

a) For a detailed explanation of the three categories, examples of deviations, and explanation of inconsistencies and alternative approaches, see lecture notes on "Economics and Psychology" and "Economics, Public Policy, and Paternalism" as well as reference (7) from lecture plan. Brief overview:

   - Categories: non-standard preferences, non-standard beliefs, non-standard decision making.
   - Possible examples: deviations from pure self-interest (e.g., ultimatum game), importance of reference points (e.g., coffee-mug experiments), bounded rationality / limited depth of reasoning (e.g., guessing game), time-inconsistent behavior, systematic biases in beliefs, etc.

b) For a detailed discussion of lab experiments, realism and generalizability, and their evaluation from different philosophical perspectives, see lecture notes on "Experiments II", "Hume, Mill and Logical Positivism", "Popper and Kuhn" as well as References (4), (5), and (6) from the lecture plan. Brief overview:

   - Realism is not a prerequisite for testing theories (e.g., tests under zero gravity in Physics)
   - A general theory should also apply to all its special cases, and can therefore also be tested under special, "unrealistic" laboratory conditions (→ falsification, Popper).
   - Problem of induction and generalizability is not specific to lab experiments.
   - Lab experiments are "real": real participants, real incentives, real decisions. Moreover, aspects that are perceived as unrealistic can be changed and systematically studied in further experiments.

Question 3

The text starts by saying that 'Economics is due for a paradigm shift'. Please concisely explain what is meant by a 'paradigm' and a 'paradigm shift' in this context. Please provide examples! Are these concepts meant to distinguish between science and non-science? Please elaborate!

As we have seen, distinguishing between science and non-science was/is an important theme in the philosophy of science. Please explain how the logical positivists have distinguished between science and non-science.

Points to be included in answer:

The points that should be include in the first part of the answer can be found on the slides of lecture 5 on 'Popper and Kuhn' and the associated mandatory readings.

The points that should be include in the second part of the answer can be found on the slides of lecture 3 on '*Logical Positivism*' and the associated mandatory readings.