Q1:

Business format franchising is common in many retail and services industries. Franchisors often employ a mix of contract forms, operating some stores directly and franchising others. Franchise contracts typically involve payments of a fixed franchise fee and royalties on sales from the franchisee to the franchisor. In return, the franchisee receives the right to sell the franchisor’s product or service and use its trademarks and business plans. Franchise contracts may also include area development plans whereby a single franchisee is awarded franchise rights for a contiguous geographic region.

Principal-agent models and property rights models provide different ways of examining the determinants of firm boundaries.

(a) Briefly summarize the key features of these two theories of firm boundaries: How are integration and non-integration defined in each class of models? What are the tradeoffs between integration and non-integration in each class of models?

(b) Use each theory to develop explanations for the following questions: When will a franchisor choose to operate stores directly and when will it choose to franchise its stores? When will area development plans be especially valuable to the franchisor and/or franchisees?

(c) Outline an empirical methodology for assessing the power of the two theories in explaining contract form in franchise systems. In your discussion, set up your null hypothesis or hypotheses, describe your sample (industry/industries, cross section/time series/panel), identify the unit of analysis, the key variables for which you would collect data, and the basic structure of a statistical model you would use to analyze the data.
It is generally assumed that investors make intertemporal allocations according to their rate of time preference (RTP), their elasticity of intertemporal substitution (EIS), and their risk preferences. More specifically, a recent analysis by Lence (2000) finds that a “generalized expected utility” (GEU) model fits U.S. farm sector consumption and asset returns data better than the alternative “myopic (static) expected utility” model. The GEU model is specified as

$$\max_{c_t,a_{it,\ldots, a_{it}}} U_t = \{(1-\beta)c_t^\beta + \beta[E_t(U_{t+1}^\alpha)]^{\alpha/\rho}\}^{1/p}$$

s.t. $c_t + \sum_{i=1}^I a_{it} \leq W_t$ and

$$W_{t+1} = \sum_{i=1}^I (1+r_{it+1})a_{it}$$

where $c_t$ denotes consumption in time $t$, $a_{it}$ is the amount invested in asset $i$, $W_t$ denotes wealth, $r_{it+1}$ is the net realized return per dollar invested, and $\beta$, $\rho$, and $\alpha$, are parameters of the agent’s utility function ($\beta$ is the discount factor per period).

a) Using the GEU model, identify the RTP, the EIS, and CRR (coefficient of relative risk aversion) of the agent and provide a brief definition of each. Why is it important to quantify the RTP, EIS and CRR of agents? Use illustrations to make your points clear.

b) The GEU model is also called “forward-looking” and a “nonexpected utility model” - what do those phrases mean?

c) Using the GEU model derive and interpret the first-order necessary condition (Euler equation) for the $i^{th}$ asset, also please identify and interpret the “stochastic discount factor” in that first-order condition.

d) Assume you have conducted an appropriate empirical analysis of the GEU model for U.S. agriculture and you have estimated the parameters of the Euler equations. Of what practical significance are those estimates for understanding the behavior of agricultural asset returns and prices? Please be as specific as you can be.
Q3:

The binomial option pricing model developed by Cox, Ross and Rubenstein (1979) has been used widely to compute the prices of various option contracts and instruments (financial options and real options).

a) Identify the binomial option pricing model by specifying its underlying assumptions, and illustrating how the approach works for a 2-state stock price process. Carefully define your terms and notation.

b) Briefly discuss the essential differences between the “replicating portfolio approach” and the “risk neutral probability approach” to binomial option pricing. What role does the absence of arbitrage play in these approaches?

c) Use the replicating portfolio approach to illustrate how it can be used to price a European call option that is one period from maturity. Assume the underlying asset is a nondividend-paying stock. Carefully define your terms and notation.
Q4:

In recent years, health concerns have led many consumers to seek out natural and organic food products. In October 2002, the U.S. Department of Agriculture (USDA) put in place a set of national standards that foods must meet in order to bear the label “organic”. However, the USDA does not enforce standards for labels such as “natural”, “free-range” and “hormone-free”. Consumers have heterogeneous preferences for natural/organic food.

The informative and persuasive views of advertising offer different ways to analyze the effects of food labels and labeling standards on consumer behavior and market outcomes.

(a) Briefly summarize the key features of the two views: How does advertising affect the demand for the advertised product? How should advertising affect prices and product quality in equilibrium?

(b) Use each theory to develop conceptual models for how prices and quality for food products as a whole should differ before and after the regulatory change in 2002. Consider the effects of heterogeneous preferences on your predictions.

(c) Outline an empirical methodology for assessing the explanatory power of each view in understanding the effects of food label standards. In your discussion, set up your null hypothesis or hypotheses, identify the unit of analysis, the key variables for which you would collect data, and the basic structure of a statistical model you would use to analyze the data.
Q5:

Consider the case of Country T in which processing-quality tomatoes are produced all year round by many small growers who take their input and output prices as given. The farm tomatoes are then processed into tomato sauce, via a quasi fixed-proportions technology wherein substitution between farm tomatoes and processing inputs (e.g., labor, energy, and capital) is not possible, but substitution among processing inputs is allowed. The processed products are sold in the domestic and international markets.

Since there are only few tomato processors in Country T, it is suspected that those processors may possess market power in the procurement of farm tomatoes and/or in the domestic sale of tomato sauce. However, the processors are assumed to take the output price in the export market as given.

The government in Country T is considering a policy encouraging the adoption by tomato growers of a mechanical harvesting technology, with the goal of benefiting the growers. However, concerns have been raised that a significant portion of the technology adoption benefit may actually go to the limited number of tomato processors because of the oligopsonistic and/or oligopolistic nature of the domestic industry.

a. Present a conceptual model that can be used as a foundation for the investigation of the oligopsonistic/oligopolistic power of the processors. Discuss the theoretical insights therein.

b. Present the empirical specification and the hypotheses to be tested. Discuss the estimation procedure and the data need.

c. Explain how you would use the estimated model to analyze the distributional effect of the technology adoption.

d. Discuss and graphically illustrate how you would proceed with the measurement of welfare implications of the technology adoption.
Q6:

The concepts of competitive spatial equilibrium and market integration are interrelated and of interest to economists. The test of spatial equilibrium examines whether trade exhausts all rents to arbitrage, while the test of market integration has to do with the extent to which shocks are transmitted among spatially separate markets.

Recent studies on issues related to market integration and spatial equilibrium can be classified into three frameworks: (i) price correlation models, allowing for short-run and long-run market integrations; (ii) switching regime models, accounting for the multiple regimes that may result from variations in transactions costs; and (iii) threshold models, recognizing that, due to the presence of adjustment costs, market shocks must exceed a certain threshold magnitude before price adjustments are provoked.

a. Discuss the normative implications of market integration and spatial equilibrium, and possible reasons for their failures.

b. Discuss how you would use framework (i) to test for market integration and/or spatial equilibrium. Discuss the model, state the hypotheses and outline (and justify) the estimation procedure. Comment on the strengths and limitations of this framework.

c. Discuss how you would use framework (ii) to test for market integration and/or spatial equilibrium. Discuss the model, state the hypotheses and outline (and justify) the estimation procedure. Comment on the strengths and limitations of this framework.

d. Discuss how you would use framework (iii) to test for market integration and/or spatial equilibrium. Discuss the model, state the hypotheses and outline (and justify) the estimation procedure. Comment on the strengths and limitations of this framework.
Q7:

Directional distance functions

1) Consider the directional input distance function given by

\[ \bar{D}_r(x, y; 1) = -\sqrt{(y_1)^2 + (y_2)^2} + (x_1)^{0.5}(x_2)^{0.5}. \]  

Here \( x = (x_1, x_2) \in \mathbb{R}_+^2 \) is a vector of inputs, \( y = (y_1, y_2) \in \mathbb{R}_+^2 \) is a vector of outputs, and \( g_r = 1 = (1, 1) \in \mathbb{R}_+^2 \) is a directional vector.

a) Is the input-output combination \( (x, y) = (x_1, x_2, y_1, y_2) = (2, 2, \sqrt{2}, \sqrt{2}) \) technically feasible? Explain your answer.

b) Is this directional output distance function homogeneous of degree zero in inputs and outputs?

c) Assuming efficient production, derive the cost function corresponding to \( D_r(\cdot) \).

d) Is this cost function (give concise, complete explanations):

i) linearly homogeneous in prices,

ii) concave in prices,

iii) nondecreasing in input prices?

2) Assume the direction \( g = 1 \), and consider the following quadratic technology distance function:

\[ \bar{D}_r(x, y; 1, 1) = \alpha_0 + \alpha_1 y + 0.5 \alpha_{11} y^2 + \beta_1 x + 0.5 \beta_{11} x^2 + \gamma_{11} x. \]

a) What restrictions on the parameters ensure translation is satisfied?

b) Is this function homothetic in inputs and outputs?
Q8:

Application: You have collected farm level data from farm/household units in six villages in a sub-region of Andra Pradesh, India. You have data on 50 households in each village. For each farm, the major inputs were fertilizer, fuel, labor, land, seed, and irrigation water. You have price and level data for each of the input categories. The major outputs were rice and chickpeas. You have price and level data for both outputs. A well functioning market exists for each input and output in the region, and each farm faces the same input and output prices. Most of the households in the region are subsistence farmers and you have been asked to search for evidence that credit constraints impacted, negatively, household income (profit).

1) Give a brief description of how you would conduct such a study using non-parametric, piece-wise linear methods. Your discussion should include at least the following points: (i) your representation of the underlying technology, its properties regarding returns to scale and disposability, (ii) the restrictions you would place on the parameters of the technology and what the restrictions mean, and (iii) the efficiency measure (e.g., distance function, Nerlovian efficiency, profit based measure, etc).

2) Give a graphical representation of the efficiency measure you discussed in part 1) of this question. In other words, if you used a Nerlovian or profit index approach, show on the graph a firm with and without a credit constraint. For your graph, be sure to specify the technology's properties regarding returns-to-scale and input or output disposability. For the sake of illustration (and for the sake of simplicity), assume: (i) there are five households, and each household produces uses one input to produce one output, (ii) the output price and input price are equal, and (iii) at least one household is credit constrained. You can assume anything you like regarding returns to scale and disposability. Simply specify your assumptions.