Simon Fraser University
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FINAL EXAM

This is a closed book examination. To receive full credit you need to answer ALL questions. Please **always explain** how you obtained your answers – no points will be given for numerical or other answers without explanations. **You have 2 HOURS to complete the exam. The total number of points is 100.**

I. TRUE/FALSE – explain your answers! (5 pts each, 30 pts in total)

1. The Murphy-Schleifer-Vishny model of coordination failure shows that the only path from an economy based on subsistence agriculture to a modern growing economy is government-financed mass industrialization policy.

2. With perfect risk sharing in a multiperiod economy there is no need for storage and thus storage will never be used.

3. The model of moral hazard in credit markets from class predicts that because debt-financed investors are afraid of default they would put in more effort than self-financed investors.

4. Field experiments are the only method to evaluate economic programs or policies that is free from selection bias.

5. In developing countries smaller farms have been found empirically to have high productivity than larger farms because of incentive issues with hired labor.

6. Foreign aid has been largely unsuccessful to generate growth in developing countries because giving aid has not been properly conditioned on following sound economic policies.

II. PROBLEMS

Problem 1 (35 pts)

A collective farm with two members produces joint output y using the production function $y = l_1 + l_2$, where l_1 and l_2 denote the labor effort levels supplied by the two members. Each member has the utility function $U(c_i, l_i) = c_i - \frac{l_i^2}{2}$, where c_i is his consumption and l_i is his labor. There is no storage or borrowing – the resource constraint for the economy is $c_1 + c_2 = y$.

(a) Solve for the first-best effort levels, l_i (i.e., l_1 and l_2 which maximize the sum of agents' utilities subject to the resource constraint). How much is the first-best output?

(b) Now suppose l_i are chosen independently by each farmer i under the arrangement that total output y will be shared *equally*. That is, $c_i = \frac{y}{2}$ for $i = 1, 2$. Find the optimal values of l_1, l_2 and total output y in this case. Compare these values with those from (a) and explain the economic intuition why they differ.

(c) Suppose now the farmers do not observe each other's efforts. They want to implement the best possible sharing rule s (that is, farmer 1 gets share s of output y while farmer 2 gets share $1 - s$), given incentive compatibility, that is, each farmer choosing l_i independently, taking as given the sharing rule $s \in [0, 1]$. What value of s would they choose to maximize the sum of their utilities? What will be the labor efforts l_i and total output y in this case? Compare your results with parts (a) and (b) and explain the intuition for the differences, if any.

(d) Finally, suppose instead that the output is a *public good* – that is, if y is created each farmer enjoys utility $\ln y - \frac{l_i^2}{2}$ (note: each consumes $c_i = y$). Assume the farmers choose their efforts l_1 and l_2 simultaneously and non-cooperatively. What are their Nash equilibrium choices l_1 and l_2? How much is total output y in this case?

(e) **7 bonus points:** how do your results in (d) compare with the first best outcome if you assumed the same preferences (i.e., solve for the first best again, as in (a), but with utilities $\ln c_i - \frac{l_i^2}{2}$ and compare). Explain the intuition.

Problem 2 (35 pts)

Karl Marx once said that society should follow the principle "From each according to his ability, to each according to his needs". This problem investigates Marx's statement using concepts from contract theory learned in class.

Suppose there are only two people in society, A and B. Person A has higher "ability" than B. That is, A produces $q_A = \alpha_A l$ units of output for l hours worked, while person B produces $q_B = \alpha_B l$ units of output for l hours worked, where $\alpha_A > \alpha_B > 0$. The cost of labor effort is the same for both A and B and equals $c(l)$ – a strictly increasing and strictly convex function. Person B has higher "needs" (higher marginal utility of consumption) than A. That is, B's utility function is $U_B = \eta_B u(c_B) - c(l_B)$ while A's utility is $U_A = \eta_A u(c_A) - c(l_A)$ where $\eta_B > \eta_A > 0$, u is a strictly increasing and strictly concave function, and where c_B, l_B are B's consumption and hours worked respectively and c_A, l_A are A's consumption and hours worked.

Consider the problem of finding the optimal allocation of labor (l_A and l_B) and consumption (c_A and c_B) in this society that a 'social planner' would implement under the following four scenarios about what the planner can or cannot observe or know:

	abilities, α_A and α_B	**needs, η_A and η_B**
Case 1	can observe	can observe
Case 2	can observe	cannot observe
Case 3	cannot observe	can observe
Case 4	cannot observe	cannot observe

The planner's objective is to maximize the sum of agents' utilities by assigning consumption levels, c_A, c_B and effort levels, l_A, l_B to each person, subject to society's resource constraint:

$$c_A + c_B = y_A + y_B$$

Assume that, if the planner cannot observe agents' type (need, ability, or both), then the agents would choose to report that they are of the type that gives them higher utility, given the announced consumption and labor allocations by the planner. *Hint: think what incentive compatibility conditions this implies about the proposed consumption and labor allocations.*

Prove your answers below with formal derivations using the first order conditions of the planner's problem in each case but note that you do not need to (and cannot) solve for c_A, c_B, l_A and l_B explicitly.

(a) Does Marx's principle, i.e., that $c_B > c_A$ and $l_A > l_B$ at the optimal allocation, apply in any of the four cases above? Which one? Explain the intuition why.

(b) In what case(s) does the part about "*From each according to his ability"* apply? Explain the intuition.

(c) In what case(s) does the part about "*...to each according to his needs"* apply? Explain the intuition.

(d) Prove that Marx's principle fails completely in Case 4. What (in)equalities must hold between the optimal c_A and c_B and between the optimal l_A and l_B in that case?

(e) Which of the four cases do you find the most realistic? Discuss briefly the relevance of the above results for development.