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ECON-UA 323

Sample Examination 1, Version 1, Fall 2026

NO CALCULATORS, IPADS, LAPTOPS, ETC., ALLOWED. PUT THEM AWAY, PLEASE.

Points 65. Time 75 minutes. The first question carries 30 points; the second 17 points, and the third 14 points. 4 points are reserved for extra credit, presentation and clarity.

Guide for Time Allocation: *The questions in (1) should take no more than 5 minutes each to answer; total 30 minutes. Questions (2) and (3) should take you no more than 15 minutes each. This schedule will allow you to finish the exam in 60 minutes. If you are stuck with a question, move on to the next one and plan to come back later. Keep your answers brief and to the point.*

(1) (30 points, 6 points per part, 5 parts) Are the following statements true or false? It is *not* enough to just guess one or the other. You need to provide an argument for or against, and only then will any credit be awarded.

[a] If a production function defined on two inputs (say capital and labor) has constant marginal returns to *each input*, then it must exhibit increasing returns to *scale*.

[b] In the Solow model with no technical progress, if the savings rate increases, then there exists *some* change in the population growth that “cancels” the savings rate increase, so that per-capita income in steady state is unchanged.

[c] In the surplus labor phase of the open-economy Lewis model with laborers equally capable of working in either sector, a small expansion in the modern sector’s capital stock raises modern employment, *but not the wage*.

[d] A country that grows at 5% a year for the next 28 years, and then shrinks by 1% a year for the next 140 years is back to approximately where it started (in terms of income).

[e] This could conceivably be a possible mobility matrix across four relative income categories:

	1	2	3	4
1	77%	15%	12%	0%
2	0%	0%	65%	35%
3	0%	50%	50%	0%
4	0%	0%	0	100%

(2) (17 points) The country of Kaleckia has 10,000 inhabitants and two potential sectors, a and m . It is a closed economy and needs to produce its own food for work subsistence: $z = 2$ per person for every employed person. The same skills are needed for either sector and

labor moves freely across them. The production functions in sectors a and m are given by

$$Y_a = 20\sqrt{K_a L_a} \text{ and } Y_m = 10\sqrt{K_m L_m}$$

In both sectors, labor is chosen to maximize profits.

- (a) [4 points] Write down the Kalecki-Rao constraint, and show that the *minimum* value of K_a that just feasibly allows all 10,000 to consume the work subsistence $z = 2$ is given by $K_a = 100$. (This is not a question about markets, but about what's plain feasible.)
- (b) [5 points] Now show that with profit maximizing production in both sectors and with $K_a = 100$, total employment in *market equilibrium* is just 5000 — very different from (a).
- (c) [3 points] Explain clearly why this employment figure is *completely independent* of the value of K_m , but why it may be expected to change when K_a changes.
- (d) [5 points] Find the minimum value of K_a that permits full employment *in market equilibrium*. Explain why the answers to (a) and (d) are different.

(3) (14 points) The country of Rápido has a production function which depends on capital and labor, and at any date t , it is given by

$$Y = 9K^{1/3}[e(t)L]^{2/3}.$$

where $e(t) = (1 + \pi)^t$ is the exogenous productivity of labor at time t , growing at a constant rate π .

- (a) [4 points] Find a formula for per-effective-capita production $\hat{y}$ as a function of the per-effective-capita capital stock $\hat{k}$, and explain the steps to get there.
- (b) [5 points] In Rápido, capital has depreciation rate δ , population growth n , and savings rate s . Show that steady state path of output per-capita is given by

$$y^*(t) = 27 \left(\frac{s}{\delta + \pi + n} \right)^{1/2} (1 + \pi)^t,$$

describing precisely all the steps that lead to this conclusion.

- (c) [5 points] Now set technical change and depreciation both equal to zero in Rápido. Show that the coefficient on log savings rate is equal in magnitude to, but has the opposite sign of, the coefficient on log population growth, in any regression of steady state per-capita output on these parameters. Discuss this intuitively.