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ECON-UA 323

Sample Examination 1, Version 2, 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 15 points. 3 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] A production function defined on three inputs (say physical capital, human capital and unskilled labor) can exhibit diminishing returns to *each one* of these three inputs, *and* increasing returns to scale.

[b] The Harrod-Domar model is capable of generating persistent growth in the *per-capita* capital stock (and therefore in per-capita income), even without any technical progress.

[c] Under the Kalecki-Rao constraint $Y_a = z(L_a + L_m)$, a change in the modern capital stock K_m has no effect on modern sector output.

[d] A country which has been growing steadily at 2% per year and now has a per-capita income of \$80,000 would have a per-capita income under \$5000 a century and a half ago.

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

	1	2	3	4
1	80%	20%	0%	0%
2	0%	15%	65%	35%
3	0%	50%	50%	0%
4	0%	0%	0	100%

(2) (17 points) The country of Kuznetsia has 1500 inhabitants and two potential sectors, a and m . The production functions in sectors a and m are given by

$$Y_a = 600\sqrt{L_a} \text{ and } Y_m = 15\sqrt{K_m L_m}$$

respectively. The price of the a good is 1 and the price of the m good is fixed at $p = 2$, so this is an open economy with no Kalecki-Rao constraint. There is a work subsistence of $z = 10$, defined in units of the agricultural good. In both sectors, labor is chosen to maximize profits.

(a) [4 points] If $K_m = 0$, so that the m -sector is inactive, show that Kuznetsia cannot fully employ its entire labor force. Compute the share of the labor force that is indeed hired.

(b) [5 points] Next, suppose K_m jumps up to 400, so the modern sector springs to life. However, suppose that only 10% of the labor force have the skills to work in the m -sector. What will be the wages in the two sectors now? And is there full employment? Why or why not?

(c) [5 points] A few years later, the capital stock K_m is still fixed at 400, but now everyone can work in the modern sector. Is there still some unemployment? What will be the new wages in the two sectors of Kuznetsia?

(d) [3 points] Using the answers to (b) and (c) as anchors, draw a graph with a written explanation that shows both the evolution of employment and the path of wages in Kuznetsia as the proportion of workers capable of working in the new m -sector climbs up from 10% to 100%.

(3) (15 points) The country of Lento has a production function which depends on capital and labor, and at any date t , it is given by

$$Y = 8K^{1/4}[e(t)L]^{3/4}.$$

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

(a) [3 points] Find a formula for per-effective-capita production $\hat{y}$ as a function of the per-effective-capita capital stock $\hat{k}$.

(b) [4 points] In Lento, capital has depreciation rate δ , but there is no population growth of labor (L is constant). The savings rate is given by s . Show that steady state path of output per-capita is given by

$$(1) \quad y^*(t) = 16 \left(\frac{s}{\delta + \pi} \right)^{1/3} (1 + \pi)^t,$$

describing precisely all the steps that lead to this conclusion.

(c) [4 points] If Lento initially has per-capita income *below* its steady state path, explain why its growth rate of per-capita income will *exceed* π .

(d) [4 points] If Lento initially has per-capita income *above* its steady state path, then will the growth rate of its per-capita income be positive, negative, or ambiguous? Discuss.