

Midterm 1

Econ 381, Prof. Evans

Testing Center: October 8–10, 2008

INSTRUCTIONS:

- Please read each question below carefully, and respond to the questions on a separate sheet of scratch paper. You must show your work.
 - When finished with the test, staple your scratch paper with your answers and your work to this test when you turn it in.
 - You may use a testing center issued calculator.
 - This midterm consists of the following two sections that total 100 points possible:
 - Part 1: Short answer, 40 points possible
 - Part 2: Analytical problems, 60 points possible
 - Good luck.
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Part 1: Short answer

(40 points possible, 2 points each)

1. Define macroeconomics.
2. What are the three requirements for a good macroeconomic model?
3. If one proposes a model in which steady state unemployment is a function of the job finding rate f and the job separation rate s , what are the exogenous variables and what are the endogenous variables?
4. Some macroeconomic variables are stocks and others are flows. List all the variables below that are flows.
 - wealth
 - income
 - expenditure
 - labor force
 - job growth
 - investment
 - capital
 - government budget deficit
 - debt
 - trade deficit

5. Define the classical dichotomy.
6. Show whether or not the aggregate production function $Y = F(K, L) = K + L$ exhibits constant returns to scale.
7. True or False. An economy characterized by population growth n (such that $\Delta L = nL$) and no growth in the efficiency of labor $g = 0$ (no labor-augmenting technological progress) can exhibit a steady state growth rate of output per worker Y/L that is greater than zero.
8. If nominal GDP is equal to \$13 trillion and the GDP deflator equals 1.1, what is real GDP?
9. If a price index value is 1.1, what is the implied inflation rate from the base year of that price index?
10. True or False. If two countries (country 1 and country 2) are identical in all their characteristics except that they both have different savings rates ($s_1 \neq s_2$) and they both have different initial capital stocks ($k_1 \neq k_2$), they might converge to the same steady state output per worker $y_1^* = y_2^*$.
11. What percent of GDP is consumption in the United States?
12. Which price index, out of the CPI or the GDP deflator, includes the price of foreign goods that are purchased by United States citizens?
13. True or False. The number of businesses surveyed monthly in the Establishment survey for employment numbers is greater than the number of individuals surveyed monthly in the Household survey.
14. Show that the Cobb-Douglas production function of the form $Y = K^\alpha L^{1-\alpha}$ implies that the real wage $\frac{W}{P}$ is proportional to the average productivity of labor $\frac{Y}{L}$.
15. Describe the three main characteristics of money.
16. Describe the difference between commodity money and fiat money.
17. According to the quantity theory of money, what is the sole determinant of the price level and, thereby, inflation?
18. Who gains and who loses from inflation?
19. How might unemployment insurance affect the job finding rate f and the job separation rate s and, thereby, the steady state unemployment rate?
20. If the sum of public and private savings in the United States is less than the amount of investment in the United States, which is bigger out of U.S. imports and U.S. exports?

Part 2: Analytical problems

(60 points possible)

21. **Capital demand (10 points).** Derive from the firm profit maximization problem the result that the optimal level of capital demanded by firms is the capital stock at which the marginal product of capital equals the real rental rate of capital $MPK = \frac{R}{P}$.
22. **Comparison of price indices, Laspeyres vs. Paasche (15 points).** The following table summarizes prices and consumption in the country Macrolandia over time on August 2007 and again on August 2008. Citizens of Macrolandia only consume and produce two goods—apples and oranges.

Table 1: Macrolandia Prices and Consumption

month and year	price of apples $P_{a,t}$	apples consumed A_t	price of oranges $P_{o,t}$	oranges consumed O_y
August 2007	\$0.50	10	\$1.00	5
August 2008	\$0.65	11	\$1.15	6

- (a) If the value of the price index is equal to 1 in August 2007, calculate a Laspeyres, CPI-type price index value for Macrolandia in August 2008.
- (b) If the value of the price index is equal to 1 in August 2007, calculate a Paasche, GDP deflator-type price index value for Macrolandia in August 2008.
- (c) Which index indicates that prices in Macrolandia have increased the most? Why?

23. **Theory of National Income (15 points).** Assume that real GDP Y can be decomposed into aggregate consumption C , aggregate investment I , and government spending G in the following way:

$$Y = C + I + G$$

Furthermore, assume that real GDP is fixed because capital and labor are fixed $\bar{Y} = F(\bar{K}, \bar{L})$. Assume that government spending \bar{G} is fixed and that taxes \bar{T} are fixed. Also, assume that consumption is a positive function of disposable income in the following way $\bar{C} = C(\bar{Y} - \bar{T})$ and is, therefore, fixed. Lastly, assume that investment $I(r)$ is a negative function of the real rate of return on investment r , such that when r goes up, I goes down, and vice versa.

- (a) Define private and public saving in this model.
- (b) What happens to private and public saving, if the government increases government spending \bar{G} ?
- (c) Explain how the rate of return on investment r will change to equilibrate the new level of national savings with investment.

24. **Labor augmenting technological progress economy (20 points).** The country of Bailoutville is characterized by an aggregate production function of the form $Y = K^{1/3}L^{2/3}E^{2/3}$, where K is the aggregate capital stock, L is the labor force, and E is the efficiency of labor. The population in Bailoutville is growing at rate n such that $\Delta L = nL$, and the efficiency of labor is growing at rate g such that $\Delta E = gE$. The investment function of each worker is to save a fraction s of their income $i = sy$. Therefore, their consumption functions are to consume the remaining fraction of their income $c = (1 - s)y$.

- (a) Define output per effective worker as $y \equiv \frac{Y}{LE}$, and define capital per effective worker as $k \equiv \frac{K}{LE}$. What is the form of the output per effective worker production function $y = f(k)$?
- (b) Given the savings rate s , depreciation rate δ , population growth rate n , labor augmenting technological progress growth rate g , and the exact functional form for the output per effective worker production function $y = f(k)$, write the expression for the steady state capital stock per effective worker k^* .
- (c) Given the savings rate s , depreciation rate δ , population growth rate n , labor augmenting technological progress growth rate g , and the exact functional form for the output per effective worker production function $y = f(k)$, write the expression for the golden rule level of capital k_{gold}^* that maximizes steady state consumption c^* .
- (d) If the initial steady state capital stock per worker k_0^* were less than the golden rule level of capital k_{gold}^* , what are three exogenous variables that a government might try to influence with policy in order to move the economy closer to the golden rule level of capital? In what direction would the government want to influence these variables? [Hint: it might help to draw a graph.]