ECON 010- Principles of Macroeconomics    Signature: _____

Drake University, Fall 2024

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## EXAMINATION 3  VERSION A
## "Long-Run Economic Growth and Inflation"
## November 4, 2024

INSTRUCTIONS:  This exam is closed-book, closed-notes.  Simple calculators are permitted, but graphing calculators or calculators with alphabetical keyboards are NOT permitted.  Cell phones or other wireless devices are NOT permitted.  Point values for each question are noted in brackets.  Points will be subtracted for illegible writing or incorrect rounding.  Maximum total points are 100.

**I.  Multiple choice:**  Circle the one best answer to each question.  [1 pts each, 16 pts total]

(1) According to the aggregate production function, potential GDP depends on all of the following except
a.    the total hours worked by all workers.
b.    the money supply.
c.    the stock of economic capital.
d.    the level of technology or know-how.

(2) Thomas Malthus believed that in the long run, output per person would
a.    fall at a constant rate indefinitely.
b.    fall to the level of subsistence.
c.    grow at a constant rate indefinitely.
d.    grow at increasing rates indefinitely.

(3) Economic growth accelerated sharply due to the industrial revolution, which occurred in Great Britain around the year
a.    1200.
b.    1400.
c.    1600.
d.    1800.
e.    2000.

(4) Potential GDP grows faster in the long run, the higher the fraction of total spending on
a.    consumption.
b.    investment.
c.    government purchases.
d.    transfer payments.
e.    net exports.

(5) Spending on new economic capital, like buildings and machinery, will increase if the interest rate
a.    rises.
b.    falls.
c.    cannot be determined from information given.

(6) If the interest rate rises in the United States and remains constant in other countries, imports will increase and exports will decrease because
a.    the dollar will depreciate against other currencies.
b.    consumers will increase their total spending.
c.    exporters will be unable to borrow money.
d.    foreign importers will be unable to borrow money.
e.    the dollar will appreciate against other currencies.

(7) According to the spending allocation model, an increase in government purchases' share of GDP will cause the interest rate to
a.    rise.
b.    fall.
c.    remain constant.

(8) Suppose someone aged 69 is retired but works as a volunteer for the Red Cross.  That person would be counted by the U.S. Current Population Survey as being
a.    employed.
b.    unemployed.
c.    out of the labor force.
d.    not in the working-age population.

(9) Unemployment caused by a recession is called
a.    structural unemployment.
b.    frictional unemployment
c.    cyclical unemployment.
d.    all of the above.

(10) If a person does not have a job, and last looked for work two months ago, that person would be classified by the Bureau of Labor Statistics as
a. employed.
b. out of the labor force.
c. unemployed.
d. both (b) and (c).
e. cannot be determined from information given.

(11) The theory that unemployment is caused by wages that are above the equilibrium (or market-clearing) level is called
a. "search."
b. "Phillips curve."
c. "job rationing."
d. "human capital."

(12) Education and training are examples of
a. embodied technical change.
b. human capital.
c. intellectual property rights.
d. natural resources.

(13) In the graph below, there is evidence of convergence in GDP per capita if countries lie on
a. a horizontal line.
b. a downward-sloping line.
c. an upward-sloping line.
d. a circle.
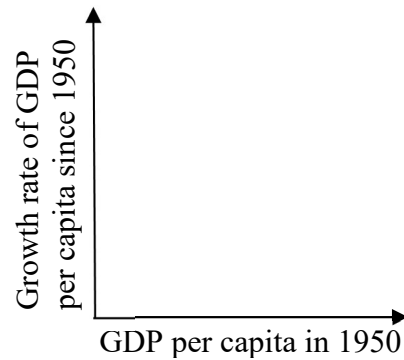


(14) The three essential functions of money include all of the following except
a. store of value.
b. method of financing government budget deficits.
c. unit of account.
d. medium of exchange.

(15) Banks create money by
a. controlling people's spending through limits on credit cards.
b. collecting currency in their vaults.
c. printing it.
d. accepting deposits and making loans.

(16) Hyperinflation is caused by excessive
a. taxes.
b. government borrowing.
c. government spending.
d. growth of the money supply.
e. consumption spending.

**II. Problems:** Insert your answer to each question in the box provided. Use graphs and margins for scratch work. Only the answers in the boxes will be graded. Work carefully: partial credit is not normally given for questions in this section.

(1) [Malthusian model: 18 pts]  The graph below shows a Malthusian model of economic growth for a particular economy, where land is fixed and labor ("total workers") is the only variable input.  For the moment, ignore the "hypothetical production function."
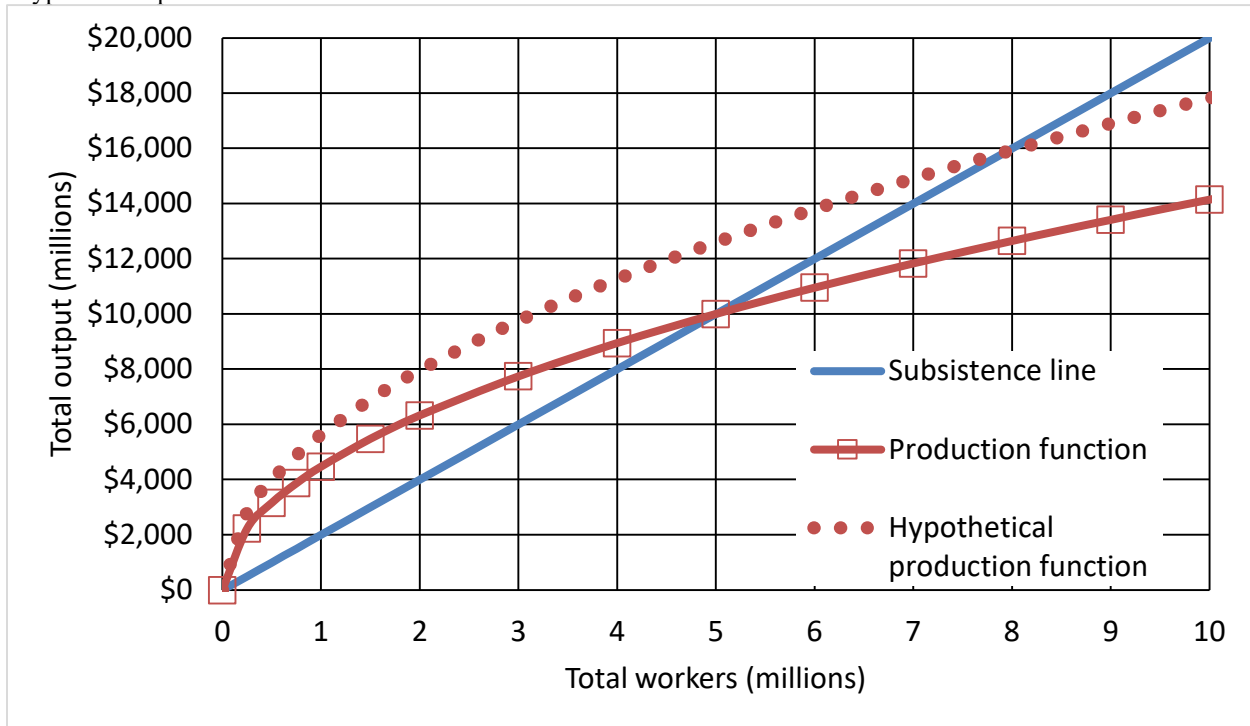


a. According to this model, how much output is required to sustain each worker?  In other words, what is the subsistence level of output per worker?

$ _____

Suppose the labor force were 3 million.
b. Would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?
c. Would the population tend to *increase, decrease, or remain constant*?

Suppose the labor force were 10 million.
d. Would there be *more than enough* food for everyone, *just enough* food, or *not enough* food?
e. Would the population tend to *increase, decrease, or remain constant*?

f. What is the *equilibrium* number of workers according to this model?

_____ million

g. What is the *equilibrium* level of annual wages (output per worker) according to this model?

$ _____

Suppose the production function shifts up to the hypothetical production function because new land is brought under cultivation.
h. What will be the eventual new equilibrium number of workers, according to this model?

_____ million

i. What will be the eventual new equilibrium level of annual wages (output per worker) according to this model?

$ _____

(2) [Growth of capital stock: 2 pts]  The following data (in chained 2017 dollars) were reported by the U.S. Bureau of Economic Analysis.

| | |
|---|---|
| Government purchases in 2020 | $3.7 trillion |
| Consumption in 2020 | $13.6 trillion |
| Gross private investment in 2020 | $3.6 trillion |
| Net exports in 2020 | $-0.7 trillion |
| Private capital stock at end of 2019 | $46.3 trillion |
| Depreciation in 2020 | $2.9 trillion |

Compute the private capital stock at the end of 2020.  [Hint:  Some data are extraneous and not needed for this problem.]

$ _____ trillion

(3) [Interest rate as opportunity cost:  4 pts]  Compute the opportunity cost of consuming $100 today, in terms of forgone consumption **3** years from today.  In other words, how much consumption **3** years from now is given up when $100 is consumed today?  Compute your answer to the nearest whole dollar…

a. … assuming an interest rate of  **2 %**.

$ _____

b. … assuming an interest rate of  **8 %**

$ _____

(4) [Interest rate and GDP shares: 10 pts]  Suppose the following three equations relate the shares of consumption (C), investment (I), and net exports (X) in total GDP (Y) to the real interest rate (r) in the long run.  In these equations, the GDP shares and the interest rate are expressed as percents.

$$(C/Y) = 75\% - 1\,r \qquad (I/Y) = 35\% - 3\,r \qquad (X/Y) = 8\% - 2\,r$$

Suppose further that the share of government purchases in GDP (G/Y) is fixed at **18 %**.  Compute the following. [Hint:  Check your answer to be sure that the four GDP *spending* shares sum to 100%.]

a. Interest rate (r)  _____ %

b. Consumption's share of GDP (C/Y):  _____ %

c. Investment's share of GDP (I/Y):  _____ %

d. Net exports' share of GDP (X/Y):  _____ %

e. Savings as a share of GDP (S/Y):  _____ %

(5) [Interest rate and GDP shares—graph: 18 pts] Consider the following scenario. Suppose government purchases' share of total output, that is (G/Y), increases. Use the graphs below of the GDP spending shares model to answer the following questions.
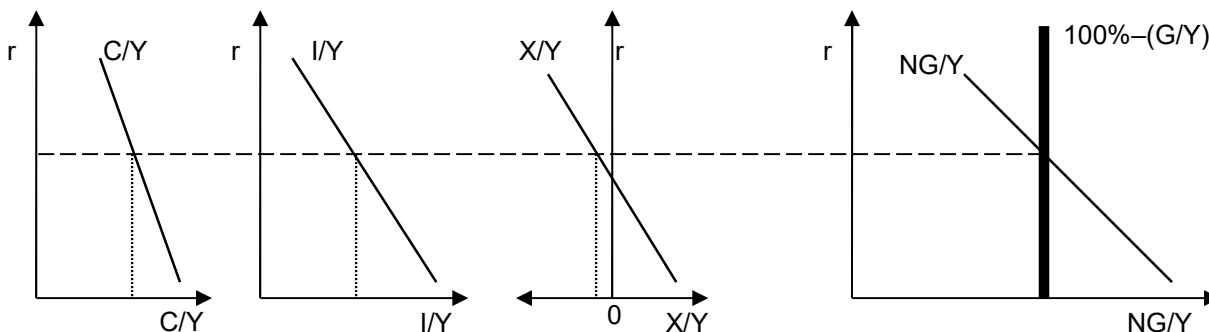


a. According to this scenario, which curve shifts: consumption's share (C/Y), investment's share (I/Y), net exports' share (X/Y), or the vertical line representing 100%-(G/Y) ?

b. Does it shift *left* or *right* ?

c. As a consequence, does the downward-sloping (NG/Y) curve shift *left*, shift *right*, or remain *unchanged* ?

d. Does the long-run real interest rate (r) *increase, decrease*, or remain *constant*?

e. Does the share of consumption spending (C/Y) *increase, decrease*, or remain *constant*?

f. Does the share of investment spending (I/Y) *increase, decrease*, or remain *constant*?

g Does the share of net exports (X/Y) *increase, decrease*, or remain *constant*?

h. Which spending component—*consumption, investment, government purchases,* or *net exports*—directly affects potential GDP in the long run?

i. Given your answer to (h), in this scenario, will long-run growth *increase, decrease,* or *remain constant?*

(6) [Measuring the labor force: 4 pts] Indicate whether each person below would be counted by the U.S. Current Population Survey as *employed, unemployed,* or *out of the labor force.*

a. A person who wants to work and last looked for a job in August.

b. A student who works 8 hours per week in the college office.

c. A person who has a catering business and is thus "self-employed."

d. A person who does unpaid volunteer work 40 hours per week for a political campaign.

(7) [Measuring the labor force: 8 pts]  The U.S. Bureau of Labor Statistics reported the following data for September 2023.  [Hint:  Some of the data are extraneous and not needed for solving this problem.]

| | |
|---|---|
| Job losers | 2.9 million |
| Discouraged workers | 0.4 million |
| Employed persons working part time for economic reasons | 22.2 million |
| New claims for unemployment insurance | 0.2 million |
| Mean duration of unemployment | 21.9 weeks |
| Not in labor force | 99.5 million |
| Employed | 161.6 million |
| Labor force | 167.9 million |

a. Compute the number of unemployed people to the nearest tenth of a million.

b. Compute the unemployment rate to the nearest tenth of a percentage point.

c. Compute the employment-to-population ratio to the nearest tenth of a percentage point.

d. Compute the labor force participation rate to the nearest tenth of a percentage point.

|  |
|---|
| million |
| % |
| % |
| % |

(8) [Technical change: 4 pts]  In France over the period 1965 to 1990, the annual growth rate of output per worker was about 2.3%, and the annual growth rate of capital per worker was about 4.2%.  Assume that the share of capital income plus depreciation in national income was about **(1/3),** as it is in the United States.

a. Compute the contribution of capital to productivity growth, to the nearest tenth of a percentage point.

b. Compute the contribution of technology to productivity growth, also called the Solow residual, to the nearest tenth of a percentage point.

|  |
|---|
| % |
| % |

(9) [Functions of money: 4 pts]  For each sentence below, indicate whether money is functioning as a *medium of exchange,* a *store of value*, or a *unit of account*.

a. A college savings plan should include a variety of assets including bank accounts.

b. A typical house in this neighborhood is worth about $400,000.

c. Bring money to buy souvenirs!

d. I have enough money in my checking account to pay off my Drake bill.

(10) [Quantity equation: 2 pts] Average annual growth rates for various items over the period 1960 to 1990 in the U.S. are reported below. [Hint: Some of the data are extraneous and not needed for this problem.]

| Real GDP | 3.6% |
|---|---|
| Investment | 8.5% |
| Government purchases | 8.1% |
| M2 | 8.2% |
| Consumer credit | 9.1% |

Assuming the velocity of money were constant, what should have been the average annual rate of inflation over this period, according to the quantity equation? Give an answer to the nearest tenth of a percentage point.

%

(11) [GDP growth around the world: 6 pts] The graph below plots the growth rate of real GDP per capita from 1990 to 2019, against initial real GDP per capita in 1990, for the U.S. and six other countries.
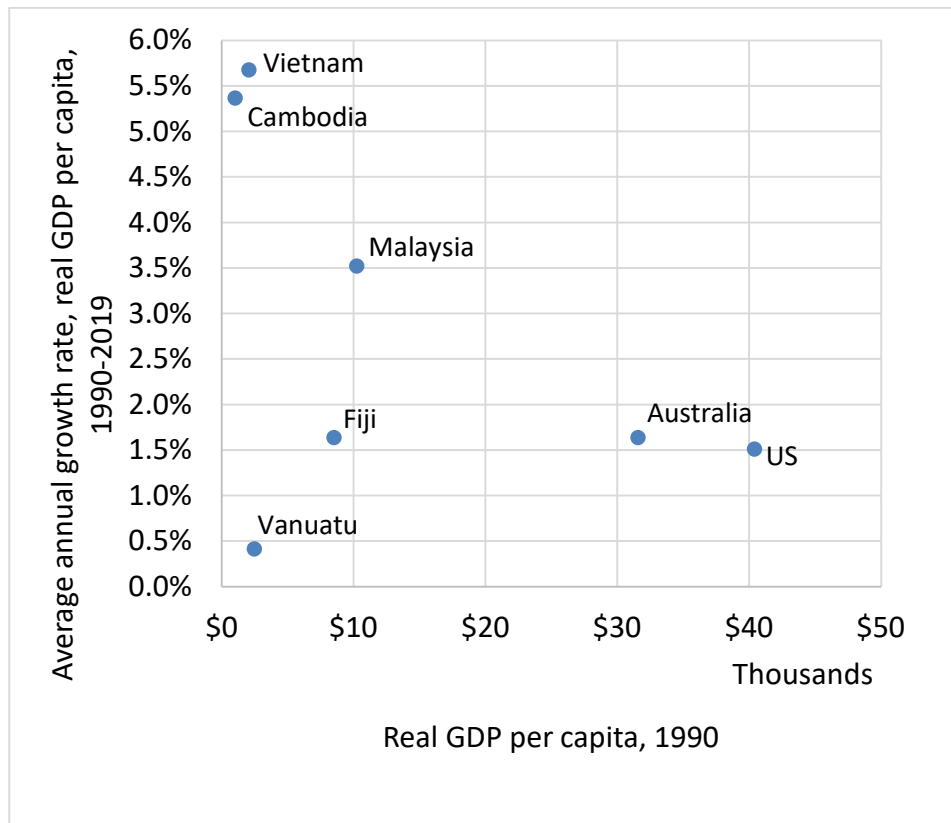


Which countries' real GDP per capita *converged* toward that of the United States over this period? Answer YES or NO.

a. Australia

b. Cambodia

c. Fiji

d. Malaysia

e. Vanuatu

f. Vietnam

**III.** **Critical thinking:** Write a one-paragraph essay answering *one* question below (your choice). [4 pts]

(1) Consider the following statement. "Consumption is about two-thirds of GDP, so to promote long-run growth, the government should encourage consumers to spend more." Do you agree or disagree? Justify your answer using the spending allocation model of GDP shares.

(2) Consider the following statement. "People who are not working are by definition unemployed." Do you agree or disagree? Why?

Please circle the question you are answering and write your answer below. Full credit requires correct economic reasoning, legible writing, good grammar including complete sentences, and accurate spelling.

[end of exam]