Economics 102
Summer 2017
Second Midterm with Answers
Date: Monday, June 19, 2017

Name ANNOTATED KEY

This exam consists of three parts: I) ten binary choice questions worth 2 points each; II) twenty multiple choice questions worth 3 points each; and II) two short answer problems worth 20 points total. All answers should be clearly and legibly recorded on the exam booklet: any answer that is not legible will be counted as a wrong answer. All answers should be presented in a neat, logical fashion in the short answer portion of the exam.

Honor Code Statement:

I,________________________, understand that it is important for me to do my own work. It is also important that I not provide help, either intentionally or unintentionally, to my fellow students. Therefore I will keep my answers covered and I will not provide answers to my classmates or take answers from my classmates. I also acknowledge that on this exam I may not have access to a calculator or a cellphone.

____________________________(Signed)

I. Binary Choice Questions (out of a possible 20 points) ________________
II. Multiple Choice Points (out of a possible 60 points) ________________
III. Problems

1. Problem 1 (out of a possible 10 points) ________________

2. Problem 2 (out of a possible 10 points) ________________

TOTAL (out of a possible 100 points) ________________

Work Space Page

I. Binary Choice Questions: (10 Questions worth 2 points each for a total of 20 points)

SOME WORK 1. Consider a situation where Bobby borrows \$20,000 from Jane for a year. A year from now Bobby will pay Jane \$21,000. Suppose that the actual inflation rate over this year is 3%. Given this information we can conclude that the nominal interest rate on this loan was 5%, the actual real interest rate on this loan was approximately 2%, and that if Bobby and Jane anticipated that the inflation rate would be 2% then Jane ended up in a worse financial position than they expected because of this transaction.

a. 5%; 2%; Jane
b. 2%; 5%; Bobby

a Ans. Sept, Oct, Nov

NOT HARD: SOME READING 2. Twenty two year old Juan left Madison on August 1, 2015 and spent the next four months traveling the world. In December 2015 Juan moved to Winston-Salem, NC to look for work as an accountant. In August and September of 2015 Juan was not working, but he completed 400 applications for work. In December of 2015 Juan was still not working, and he decided to take the last four weeks of December 2015 and the first two weeks of January 2016 off from the job hunt in order to get settled in his new location. From this information we can conclude that in September 2015 Juan was _________ and in December 2015 Juan was _________.

not available to work

a. frictionally unemployed; not part of the labor force
b. not part of the labor force; not part of the labor force

SOME WORK 3. Nominal GDP in Toptown was constant in 2013 and 2014 while real GDP in 2014 was 50% greater than real GDP in 2013. From this information we can conclude that the GDP deflator in 2013 was:

a. larger than the GDP deflator in 2014.
b. smaller than the GDP deflator in 2014.

1. $(20{,}000)(X) = 21000$

$X = \frac{21000}{20000} \Rightarrow \frac{105}{100} \Rightarrow X$ is 5%

actual real interest rate = nominal interest rate − inflation rate
" " = 5% − 3% = 2%

expected real interest rate = 3%

if actual inflation rate > anticipated inflation rate ⇒ borrower better off

3.

Year	nom GDP		real GDP		GDP deflator
2013	100*	constant	100**	↑50%	100***
2014	100		150		$\frac{100}{150}(100) \approx 67$

* made up #
** nom GDP = real GDP in BY
*** GDP def in BY = scale factor

DEFINITIONAL 4. In a well-functioning economy the unemployment rate will:

unemployment figures are reported as seasonally unadjusted and seasonally adjusted

a. be equal to the sum of frictional, structural and seasonal unemployment. → cyclical
b. be a positive percentage.

NOT HARD 5. Joey invests $4000 in 2017 in a financial instrument that pays 5% interest annually for the first 14 years; after fourteen years this instrument pays 10% interest annually. Given this information and holding everything else constant, what will be the value of Joey's holdings in 2048?

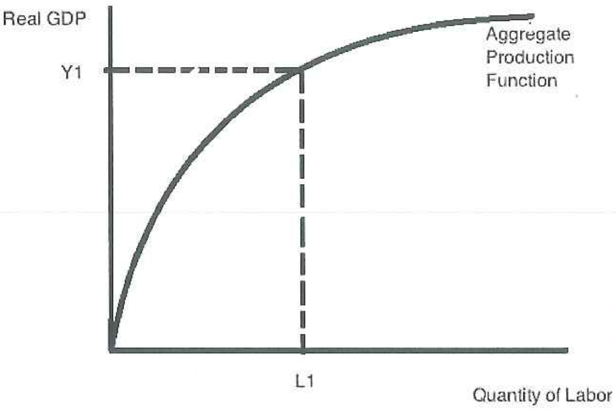
See time line below

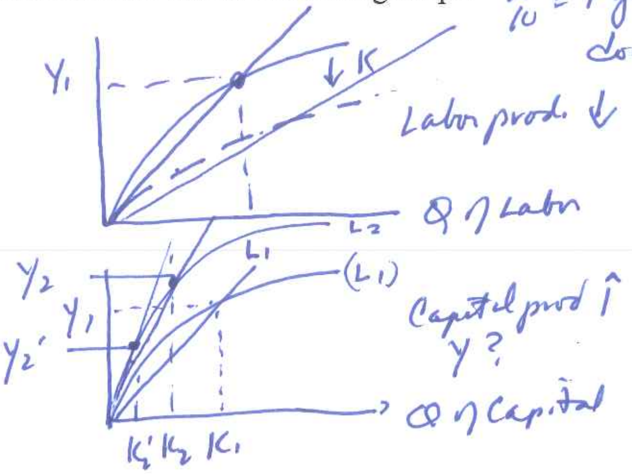
a. Joey will have holdings with a value smaller than $32,000 in 2048.
b. Joey will have holdings with a value greater than $32,000 in 2048.

$\frac{70}{5}$ = 14 years to double

HARDER, SOME THOUGHT REQUIRED 6. Consider the aggregate production function for Silvia, a small economy that is currently employing L1 units of labor. This aggregate production function has the following shape:

$\frac{70}{10}$ = 7 years to double

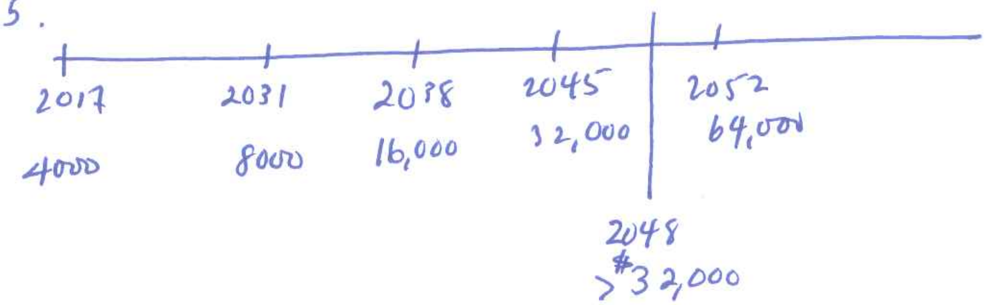




Suppose this economy hires less capital while simultaneously increasing its use of labor. Given this information and the above graph:

a. Labor productivity will decrease ✓, capital productivity will decrease and the level of real GDP will decrease.
b. Labor productivity will decrease ✓, capital productivity will increase ✓, and the level of real GDP may increase, decrease or remain the same as it was initially.

5.



DEFINITIONAL EASY

7. Suppose that the government collects \$4 million in tax revenue while passing legislation calling for the expenditure of \$3.25 million on government provided goods and services. Assume there are no transfers in this economy. Given this information and holding everything else constant, this government has:

$S_g \equiv$ government savings $= (T - TR) - G$

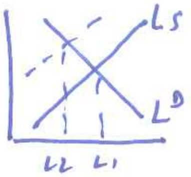
$S_g = 4 - 3.25$

$S_g > 0$

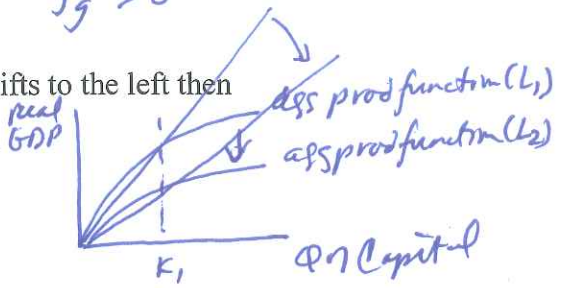
a. positive government savings.
b. negative government savings.

EASY

8. Holding everything else constant, if the supply of labor curves shifts to the left then capital productivity will:



$L_1 \downarrow$ to L_2



a. increase.
b. decrease.

DEFINITIONAL: EASY

9. Holding everything else constant, if the multiplier increases from 6 to 8, this implies that the:

$\frac{1}{1-b}$ = multiplier

$b = MPC$

if $b \uparrow \Rightarrow$ multiplier $\uparrow$

if $b \downarrow \Rightarrow$ multiplier $\downarrow$

$b \uparrow \Rightarrow$

$MPC \uparrow \Rightarrow$

$MPS \downarrow$

a. marginal propensity to save increased.
b. marginal propensity to save decreased.

SOME WORK

10. Suppose you are told that the rate of inflation in Southwood between 2015 and 2016 was -15%. If the 2016 is the base year and the CPI is measured on a 100 point scale then:

a. the CPI in 2015 must be greater than 117.
b. the CPI in 2015 must be less than 115.

	CPI BY=2016	Rate of Inflation
2015	y =	
		↓ -15%
2016	100	

$-15 = \frac{100 - y}{y} (100\%)$

$-15y = (100 - y)(100)$

$-15y = 100(100) - 100y$

$85y = 100(100)$

$y = \frac{100(100)}{85}$

$y = \frac{20(100)}{17}$

$y = \frac{2000}{17}$

$y > 117$!!

$$\begin{array}{r} 117 \\ 17\overline{)2000} \\ 17 \\ \hline 30 \\ 17 \\ \hline 130 \\ 119 \end{array}$$

II. Multiple Choice Questions (20 questions worth 3 points each for a total of 60 points)

CHALLENGING

11. Bob lives in the United States and manufactures light bulbs. In 2015 he produced 2000 lightbulbs and sold 1500 lightbulbs for $10 per lightbulb. In 2016 Bob produced 2500 lightbulbs and sold 2750 lightbulbs for $10 per lightbulb. In addition, Bob purchased $4000 worth of household goods and services in 2015 and $4200 worth of household goods and services in 2016. Within those purchases, Bob bought $400 of French wine (produced in France in 2015) in 2015 and $300 of French cheese (produced in France in 2016) in 2016. Given this information and holding everything else constant, Bob's contribution to US GDP in 2015 was ___ and his contribution to US GDP in 2016 was ____.

a. $24,000; $29,200
b. $23,600; $28,900
c. $18,600; $31,700
d. $19,000; $31,700

NOT HARD

12. The CPI in 2016 is equal to 100 and the CPI in 2017 is expected to be 110. George wants to earn a real return on his savings of 5% in 2017. Given this information and holding everything else constant, George should lend out his savings as a nominal interest rate of ______. If the CPI for 2017 is actually greater than the expected CPI for 2017 than George will be _____.

a. 10%; better off
b. 10%; worse off
c. 15%; better off
d. 15%; worse off ✓

real = nom - expected inflation
5% = nom - 10%
15% = nom

NOT HARD

13. Meredith is currently earning $40,000 per year in her job. She and her boss believe that inflation will be 5% for the following year and her boss promises Meredith that she will definitely be paid a nominal salary next year that will be great enough to result in her real income increasing over its current level. Given this information and holding everything else constant, for this to be true Meredith must be paid a salary next year that is:

a. greater than $45,000.
b. greater than $44,000.
c. greater than $43,000.
d. greater than $42,000.

5% of 40,000 = 2,000
so Meredith needs to earn more than $42,000

11. GDP_{2015}:
lightbulbs: 2000 X 10 = $20,000
Consumption: = 4 000
-imports = -400
23,600

GDP_{2016}:
lightbulbs: 2500 X 10 = $25000
Consumption: = 4200
-imports = -300
$28,900

$GDP = C + I + G + (X - IM)$

$GDP_{2015} = \underbrace{15000 + 4000}_{C} + \underbrace{5000}_{I} \underbrace{-400}_{IM}$

$GDP_{2015} = 19{,}000 + 4600 = \$23{,}600$

$GDP_{2016} = \underbrace{27500 + 4200}_{C} + \underbrace{(-2500)}_{I} \underbrace{-300}_{IM}$

$GDP_{2016} = 31{,}700 - 2800$

$GDP_{2016} = \$28{,}900$

Rule of 70: not hard - Some work & analysis

14. Suppose that real GDP per capita in Canada is growing at 3.5% a year and that real GDP per capita in India is growing at 7% a year. Suppose that today the real GDP per capita in India is $5,000 while in Canada it is $50,000. Given this information and holding everything else constant, which of the following statements is true?

a. Over time Indian citizens will grow richer but Canadians will still have a higher per capita real income than Indian citizens for the next 80 years. X No $800,000 vs $1,280,000 (see work)

b. Over time Canadians will see their real income per capita increase but since real income per capita is growing more slowly in Canada than in India we can project that in less than a century India's real income per capita will catch up and even surpass Canadian real income per capita. ✓

c. Sometime between four and five decades from now, Canada's real income per capita will be less than India's real income per capita. X No. it will take more than 6 decades

d. In a minimum of 60 years from now India' real income per capita will surpass Canadian real income per capita. No $400,000 vs 320,000 (see work)

SOME READING

15. Suppose that the natural rate of unemployment in an economy is 5% but that the economy is currently operating with an unemployment rate of 6% and its real GDP is equal to $10 million. You know that for every 0.25% decrease in the unemployment rate this economy puts 200,000 people back to work. You also know that for every 0.5% change in the unemployment rate that real GDP responds by changing by 2% from its initially given level. If this economy moves back to full employment you anticipate that holding everything else constant, that ______ people will go back to work and that real GDP will be equal to _______.

a. 800,000; increase to $10,400,000 ✓

b. 800,000; increase to $10, 800,000 X

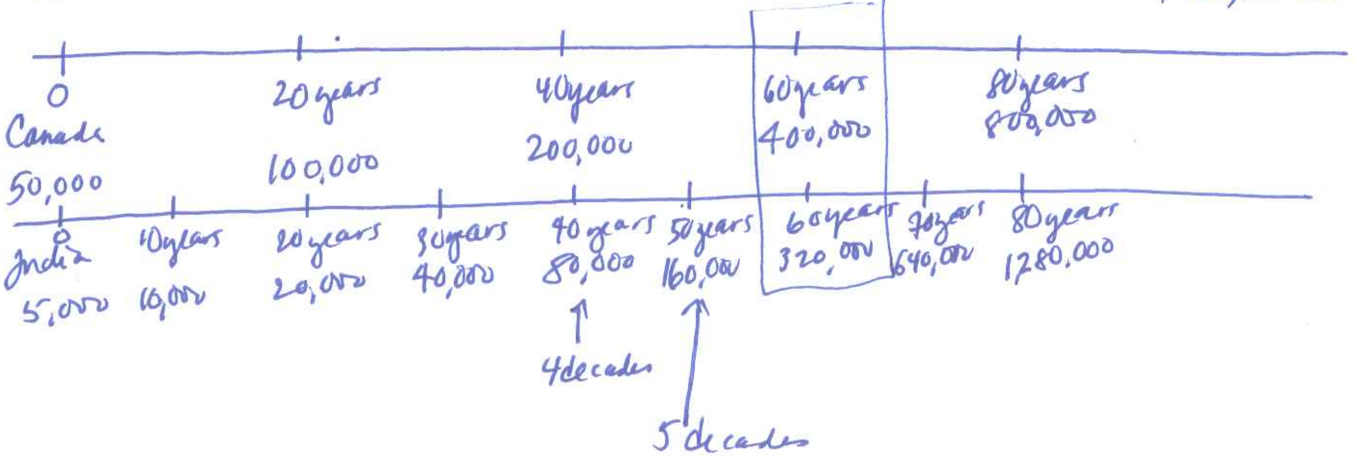
c. 1,000,000; increase to $10,400,000 X

d. 1,000,000; increase to $10,800,000 X

Need to ↓ unemployment by 1% →
4(200,000) = 800,000 workers put back to work

GDP will ↑ by 4% from initial level
10,000,000
x.04
$400,000

14.


0
Canada
50,000
20 years
100,000
40 years
200,000
60 years
400,000
80 years
800,000
India
5,000
10 years
10,000
20 years
20,000
30 years
40,000
40 years
80,000
50 years
160,000
60 years
320,000
70 years
640,000
80 years
1280,000
4 decades
5 decades

Use the following information to answer the **next two (2)** questions.

An economy's aggregate production function is given by the equation:

$$Y = 4K^{1/2}L^{1/2}$$

where Y is real GDP, K is the number of units of capital and L is the number of units of labor. You are provided the following information about the labor market in this economy where W is the wage rate per unit of labor:

Demand for Labor: L = 2000 – 100W

Supply of Labor: L = 100W - 200

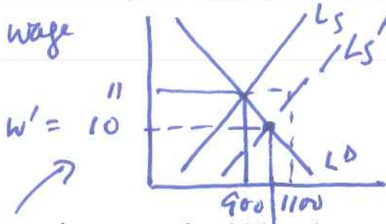
You are also told that capital in this economy is equal to 36 units. Assume that this economy is currently producing at its full employment level of real GDP.

A lot of Work

16. Given the above information, how many statements in the box are correct? ✓

- The equilibrium amount of labor in this economy is 900 units and labor productivity is equal to 24 units of output per unit of labor. No
- Labor productivity is less than capital productivity in this economy. True (see below)
- This economy is currently producing 1800 units of output. No $Y_{fe} = 720$
- For a minimum wage to be effective in this economy it would need to be set at a level greater than $11 per unit of labor. Yes (see below)

a. One statement is correct.
b. Two statements are correct.
c. Three statements are correct.
d. Four statements are correct.



$L\uparrow, w\downarrow$

For $\bar{K}$, as $L\uparrow$, $\frac{Y}{K}\uparrow$

As $L\uparrow$, $Y/L\downarrow$

Q of Labor

SOME WORK: I COULD ELIMINATE (a), (b) and (d) with the graph & simple analysis – proving (c) is a lot more work

17. Suppose the amount of labor supplied at every wage rate increases by 200 units. Which of the following statements is true given this new information and holding everything else constant?

a. The equilibrium amount of labor will increase, ✓ the equilibrium wage rate will decrease, ✓ and capital productivity will fall. X
b. The equilibrium amount of real GDP will increase, ✓ the equilibrium amount of labor will increase, labor productivity will decrease, and the equilibrium wage rate will increase. X wages ↓
c. Labor productivity and capital productivity will move in opposite directions and capital productivity will definitely be greater than 20 units of output per unit of capital.
d. Both labor productivity and capital productivity will increase as real GDP increases and wages rise.

16. $Y = 4\sqrt{K}\sqrt{L}$

$K = 36 \Rightarrow \sqrt{K} = 6$

$Y = 24\sqrt{L}$

$2000 - 100W = 100W - 200$

$2200 = 200W$

$\frac{2200}{200} = W$

$11 = W$

$L = 900$

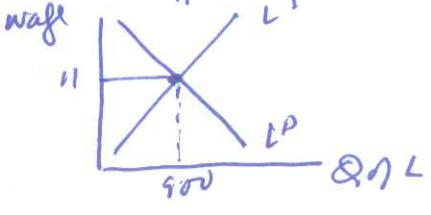
$\sqrt{L} = 30$

$Y = 24(30)$

$\boxed{Y_{fe} = 720}$

Labor prod $= \frac{Y}{L} = \frac{720}{900} = \frac{8}{10} = \frac{8/10 \text{ unit of output}}{\text{labor}}$

Capital prod $= \frac{Y}{K} = \frac{720}{36} = \frac{20 \text{ units of output}}{\text{capital}}$



$L' = 100W' - 200 + 200$

$L' = 100W'$

$100W' = 2000 - 100W'$

$200W' = 2000$

$W' = 10$

if $W' = 10 \Rightarrow L' = 1000$

$\sqrt{L'} = \sqrt{1000} = 10\sqrt{10}$

$Y' = 24(10\sqrt{10})$

$Y' = 240\sqrt{10}$

$\frac{Y'}{K} = \frac{240\sqrt{10}}{36} = \frac{40\sqrt{10}}{6} = \frac{40\cdot(3)^{+}}{6}$

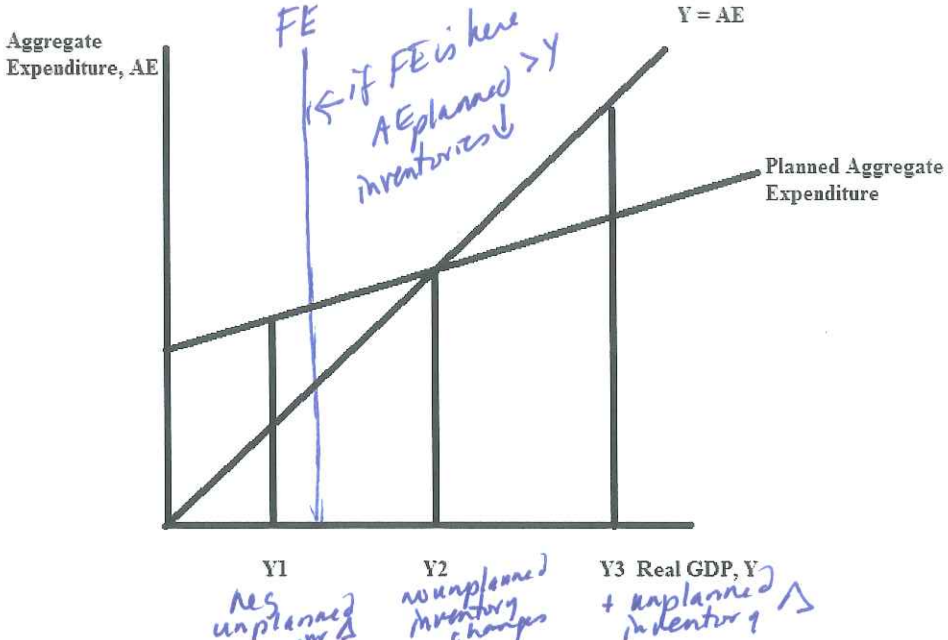
$= \frac{120^{+}}{6} >$ 20 units of output/per un

$\frac{Y'}{K}\uparrow$

$\frac{Y'}{L'} = \frac{240\sqrt{10}}{1000} = \frac{24\sqrt{10}}{100} = \frac{6\sqrt{10}}{25}\downarrow$

ANALYSIS OF GRAPH: SOME LOGIC HERE

18. Consider the following graph that depicts an economy modeled using a short-run Keynesian model where Y is real GDP.



You are told that if this economy were operating at full employment then it would experience negative unplanned inventory changes. From this information and the graph you conclude that this economy is currently operating at:

a. The full employment level of output.
b. A level of output that is greater than the full employment level of output.
c. A level of output that is less than the full employment level of output.
d. A level of real GDP that cannot be determined from the provided information.

Use the following information to answer the **next two (2)** questions.

Consider an economy that can be described by the following information:

Government Spending = \$100
Taxes = T = \$120
Transfers = TR = \$20
Investment Spending = \$20
Consumption Spending = C and where C = 80 + .8[Y – (T – TR)]) where Y is real GDP
Net Exports = -\$10

ANALYZE DATA: NOT HARD

19. Which of the following statements is true given the above information and holding everything else constant?

I. This country's government savings is equal to zero. ✓ $S_G = (T-TR) - G = (120-20) - 100 = 0$
II. This country has a trade surplus. X $X - IM > 0$ for trade surplus
III. This country has less exports than imports, ✓ $X - IM < 0$ if exports < imports
IV. The multiplier for this country equals 5. ✓ multiplier $= \frac{1}{1-b} = \frac{1}{.2} = 5$

a. Statements I, II and III are all correct statements.
b. Statements I, III, and IV are all correct statements.
c. Statement III is a correct statement.
d. Statements III and IV are both correct statements.

NOT HARD

20. Given the above information suppose that government spending decreases by \$50. If this is the only change, what will be the change in real GDP?

a. an increase of \$100
b. a decrease of \$250
c. an increase of \$200
d. a decrease of \$300

$$\Delta Y = \frac{1}{1-b}(\Delta G)$$
$$\Delta Y = \left(\frac{1}{1-.8}\right)(-50)$$
$$\Delta Y = 5(-50) = -250$$

OR,

$$Y = C + I + G + (X - IM)$$
$$Y = 80 + .8[Y - 100] + 100 + 20 + -10$$
$$Y = 190 + .8Y - 80$$
$$.2Y = 110$$
$$Y = 550$$
$$Y' = 80 + .8[Y' - 100] + 50 + 20 - 10$$
$$.2Y' = 140 - 80$$
$$.2Y' = 60$$
$$Y' = 300$$
$$\Delta Y = Y' - Y = 300 - 550 = -250!$$

Use the following information to answer the **next two (2)** questions. Assume there is no inflation in this problem.

Joel is getting ready to invest a recent windfall and he has four options:

Investment A: He deposits $5,000 today in investment A and this investment pays 3.5% a year for the next 35 years. After that the investment will pay no return on the amount in the investment at that time. 20 years to double

0 5000 | 20 years 10,000 | 40 years 20,000 | Inv A < 20,000!

Investment B: He deposits $3,000 five years from today in investment B while spending the other $2000 on a fun trip. He earns 2% a year on investment B. 35 years to double

0 | 5 years 5000 | 40 years 10,000 | 75 years 20,000 | 110 years 40,000 | 145 years 80,000

Inv B = 10,000 in 40 years

Investment C: He deposits $5,000 today in investment C and this investment pays 10% a year for 14 years and then the investment will no longer pay any return on the amount in the investment at that time. 70/10 = 7 years to double

0 5000 | 7 years 10,000 | 14 years 20,000 | Inv C = 20,000

Investment D: He deposits $5,000 today in investment D and this investment pays 5% a year for however long Joel has his money invested in this investment.

14 years to double

0 5000 | 14 years 10,000 | 28 yrs 20,000 | 42 years 40,000

A LOT OF WORK

21. Given the above information and holding everything else constant, how many of the statements in the box are true?

- If Joel intends to take his money out of the investment in fourteen years then his best investment is Investment C. ✓
- Joel would need to live an additional 130 years if he invests in Investment B and wants to earn at least $48,000 from this investment. False
- Joel's best investment if he has a time period of only 40 years is Investment D. True
- Investment A will never grow to $20,000. True

a. One statement is correct.
b. Two statements are correct.
c. Three statements are correct.
d. Four statements are correct.

NOT TOO MUCH ADDITIONAL WORK

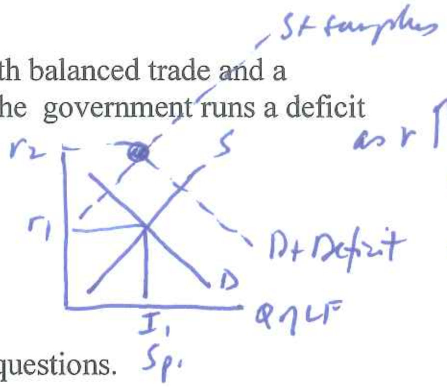
22. Given these options, suppose Joel has a thirty five year time horizon on these investments. Given this perspective and holding everything else constant, which investment should Joel choose if he only cares about the highest accumulated amount from the investment?

a. A
b. B
c. C
d. D

SOME ANALYSIS REQUIRED

23. Suppose an economy is at full employment initially with balanced trade and a balanced budget. Holding everything else constant, when the government runs a deficit and the economy runs a trade surplus this results in:

a. A decrease in private saving. X
b. An increase in private saving.
c. An increase in private investment. X
d. Leakages exceeding injections in this economy.



as r ↑ to r2 ⇒
$S_p \uparrow$
I ↓
C ↓

Use the following information to answer the next **two (2)** questions.

You are given the following information about an economy. For this economy you are told that the market basket for purposes of computing the inflation rate in the economy has been defined as 4 notebooks and 5 pizzas.

	Quantity in 2013	Price in 2013	Quantity in 2014	Price in 2014
Notebooks	10	$2.50 per notebook	10	$3 per notebook
Pizzas	20	$10 per pizza	15	$12 per pizza

NOT THAT HARD

24. If the base year is 2013, what is the rate of inflation using the CPI between 2013 and 2014?

a. 120%
b. 100%
c. 60%
d. 20%

(see below)

15
12
30
15
180

NOT TOO BAD

25. If the base year is 2013, what is the value of the GDP deflator for 2014 on a 100 point scale?

a. 90
b. 110
c. 120
d. 140

24.

Year	Cost of Market Basket
2013	$4(2.50) + 5(10) = 10 + 50 = 60$
2014	$4(3) + 5(12) = 12 + 60 = 72$

Year	CPI BY = 2013
2013	$\frac{60}{60}(100) = 100$
2014	$\frac{72}{60}(100) = \frac{12}{10}(100) = 120$

rate of inflation $= \left[\frac{120-100}{100}\right](100\%)$
$= 20\%$

25.

Year	nom GDP	real GDP	GDP deflator
2013	$25 + 200 = 225$	225*	100
2014	$30 + 180 = 210$	$25 + 150 = 175$	

$GDPdef_{2014} = \frac{210}{175}(100)$
$= \frac{210(4)}{7}$
$= 30(4) = 120$ ✓

* Nom GDP = real GDP in BY

Use the information below to answer the **next two (2)** questions.

Consider an economy where the demand for loanable funds from businesses is given by the following equation where Q is the quantity of loanable funds and r is the interest rate:

Demand for loanable funds from businesses: Q = 8,000 - 200r

Suppose that the supply of loanable funds from households (private savings) is given by the following equation where Q is the quantity of loanable funds and r is the interest rate:

Supply of loanable funds from households: Q = 200r - 4000

In both the demand and supply for loanable funds equations the interest rate is expressed as a percentage (thus, if the interest rate is 5%, then the r in the equation would be 5). Initially assume that this economy is a closed economy and that the government in this economy has a balanced budget.

SOME WORK 26. Given this information and holding everything else constant, if the government decides to run a surplus of $2000 we know with certainty that:

a. The equilibrium interest rate in the loanable funds market will be greater than 25% ✗ and that the level of private investment will be equal to $3000. ✓

[✓ b.] The equilibrium interest rate in the loanable funds market will be equal to 25% ✓ and that the equilibrium level of private investment will be equal to $3000. ✓

c. The equilibrium interest rate in the loanable funds market will be equal to 25% ✓ and that the equilibrium level of private saving will be equal to $3000. ✗

d. The equilibrium interest rate in the loanable funds market will be less than 30% ✓ and that the level of consumption spending will decrease. ✗

↳ will increase

SOME WORK 27. Given the initial information, if the government decides to run a deficit of $4000 we know, holding everything else constant, that:

a. Private investment will be crowded out by $4000. ✗ by 2000!

b. Private investment will decrease by $1000. ✗ by 2000

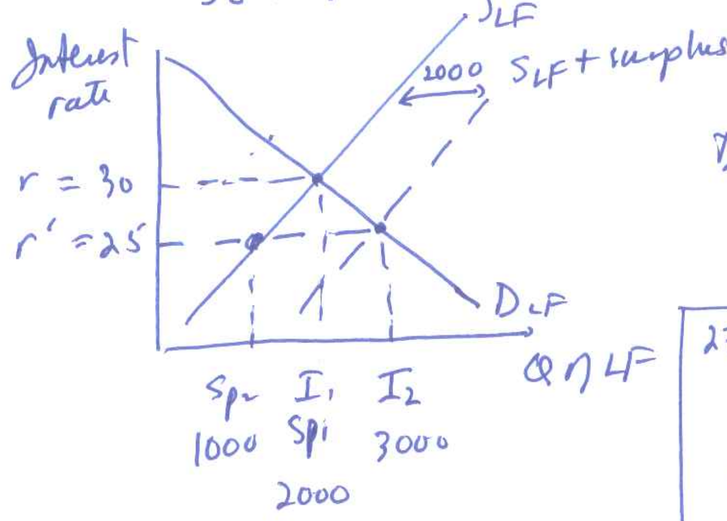
c. Private saving will increase by $2000. ✓

d. Consumption spending will increase by $2000. ✗

26. $8000 - 200r = 200r - 4000$

$12000 = 400r$

$30 = r$



$8000 - 200r' = 200r' - 2000$

$10,000 = 400r'$

$\frac{10,000}{400} = r'$

$25 = r'$

Demand for private investment $= 8000 - 200(25)$

$= 8000 - 5000 = 3000$

if $r \downarrow \Rightarrow S_p \downarrow \Rightarrow C \uparrow$

27. $12,000 - 200r'' = 200r'' - 4000$

$16000 = 400r''$

$40 = r''$

$r'' = 40 \Rightarrow S_{p3} = 4000$

$I_3 = 0$

$\rightarrow S_{p3} - S_{p1} = 4000 - 2000 = 2000$

$\rightarrow I_3 - I_1 = 0 - 2000 = -2000$

if $S_{p3} \uparrow$ then $C_3 \downarrow$

too young

not adult

28. Consider a community that has ten individuals:

- -NOT IN LF • Mary who is 15 and works fifteen hours a week as a waitress at the local coffee shop
- E • Roscoe who is 25 and works for pay for five hours a week at a local restaurant
- U • Sharon who is 25 and who is currently not working and is looking for a job: she is available to work and she is applying for jobs
- U • Mitchell who is 22 and recently graduated from college and who is looking for work: he is available to work and he is applying for jobs
- E • Tammy who is 54 and is currently unhappily employed as a part-time worker; she is looking for full-time work but she has been unable to find this type of job because of the state of the economy
- NOT IN LF • Rochelle who is 29 and who has recently returned to school to study mechanical engineering full-time → full-time student
- U • Susan who is 52 and who has recently lost her job due to changes in the technology used to produce widgets: Susan is looking for work, available to work, and is applying for jobs
- Not in LF • Jo-Jo who is 17 and who would like to work part-time while attending school as a full-time student → full-time student
- Not in LF • Maria who is 73 and plays golf every day since retiring four years ago → retired
- E • Xun who is 44 and works for pay for a bakery fifty hours a week

SOME READING: NOT TOO HARD

Given the above information, the labor force participation rate is equal to_______and the employment rate is ______ the unemployment rate.

a. 33%; greater than
b. 33%; equal to
c. 67%; equal to
d. 67%; less than

$$\text{LF participation rate} = \frac{LF}{\text{adult pop}}(100\%) = \frac{E+U}{\text{adult pop}}(100\%) = \frac{6}{9}(100\%) = 67\%$$

$$E\ \text{rate} = \frac{E}{E+U}(100\%) \qquad U\ \text{rate} = \frac{U}{U+E}(100\%)\ \text{since } E=U$$

E rate $=$ U rate

DEFINITIONAL

29. Consider a country that funds its government services through an income tax. The size of the underground economy grew this year as did the number of people working in the underground economy. Holding everything else constant we would expect to see this country's:

a. tax revenues fall and its unemployment rate rise.
b. tax revenues rise and its unemployment rate fall.
c. tax revenues fall and its unemployment rate fall.
d. tax revenues rise and its unemployment rate rise.

NOT TOO BAD - SETUP LONG, BUT WORK EASY!

30. Eugenia in her last semester at college applied for many jobs. At the end of this process she was pleased to have four job offers as provided in the table below:

Job Offer	Annual Salary	CPI	Real Salary
Job in Philadelphia	\$100,000	100	100,000
Job in Milwaukee	\$84,000	77	$(84000/77)\,100 = \frac{12000}{11}(100) \approx \$109{,}090$
Job in Minneapolis	\$90,000	90	$(90{,}000/90)(100) = 100{,}000$
Job in Duluth	\$80,000	80	$(80000/80)(100) = 100{,}000$

Eugenia cares only about the real purchasing power of her next year's salary in determining which job she will take. Eugenia's parents live in Superior (a town just across the border from Duluth) and their criteria are that Eugenia come home to live near them.

Eugenia in her Economics class learned the importance of looking at real purchasing power so she first tells her parents that these job offers are a bit more complicated than just their nominal amounts since the cost of living differs quite a bit in these four communities. Suppose that Eugenia collects data on the CPI for these four communities and finds the following data.

City	CPI for this year
Philadelphia	100
Milwaukee	77
Minneapolis	90
Duluth	80

Given this data, rank these job offers from highest real salary to lowest real salary. Given your ranking, Eugenia's tastes and preferences, and her parents tastes and preferences is Duluth an option for Eugenia?

a. Milwaukee is the best offer, and the other three offers are equivalent in terms of real purchasing power; Eugenia and her parents cannot both be satisfied given these offers.

b. Philadelphia is the best offer, followed by Duluth, Milwaukee, and Minneapolis; Eugenia and her parents cannot both be satisfied given these offers.

c. Duluth is the best offer, followed by Philadelphia, Milwaukee, and Minneapolis; Eugenia and her parents can both be satisfied given these offers.

d. Minneapolis is the best offer, followed by Philadelphia, Milwaukee, and Duluth; Eugenia and her parents cannot both be satisfied given these offers.

$$\begin{array}{r} 109090 \\ 11\overline{)1200000} \\ \underline{11} \\ 100 \\ \underline{99} \\ 1 \end{array}$$

Milwaukee : $\frac{84000}{77}(100) = \frac{12\,000}{11}(100)$

$= \frac{1{,}200{,}000}{11}$

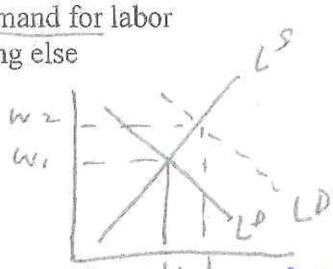
III. Problems (Two Problems Worth a Total of 20 Points)

1. (worth a total of 10 points) Consider an economy whose aggregate production function can be described by the following equation where Y is real GDP, K is units of capital, and L is units of labor:

$$Y = 5K^{0.5} L^{0.5}$$

Furthermore, in this economy you know that the level of capital is constant. You also know that the labor market for this economy can be described as consisting of a downward sloping demand for labor curve and an upward sloping supply of labor curve. You are told that the labor market is initially in equilibrium.

a. (5 points) Given the above information, suppose that at every wage rate the demand for labor increases. Based upon the information you have been given and holding everything else constant, what happens to the following?



L^S
W_2
W_1
L^D
$L^{D'}$

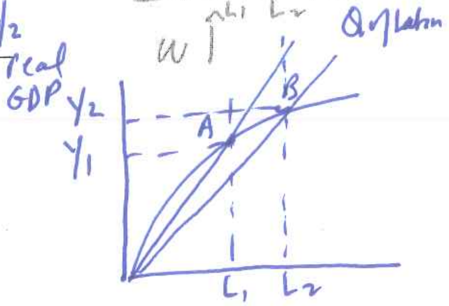
i. The equilibrium quantity of labor will ↑ L_1 to L_2

ii. The equilibrium wage rate will ↑ W_1 to W_2

iii. The level of real GDP produced in this economy will ↑ Y_1 to Y_2

iv. Labor productivity will ↓ ray going through A vs ray going through B

v. Capital productivity will ↑



L_1
L_2
Q of Labor
W
real GDP
Y_2
Y_1
A
B
L_1
L_2

Answer:

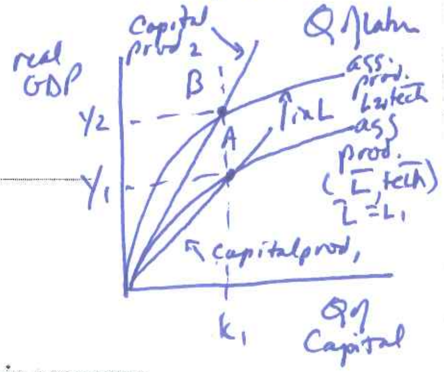
i. The equilibrium quantity of labor will _____increase_______

ii. The equilibrium wage rate will ______increase__________

iii. The level of real GDP produced in this economy will _____increase__________

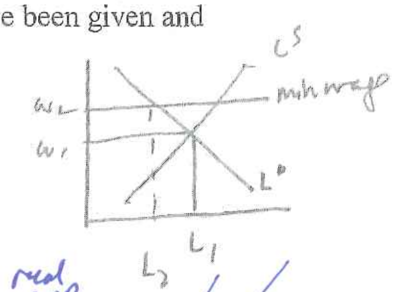
iv. Labor productivity will ___decrease_____

v. Capital productivity will ______increase_________



real GDP
Capital prod 2
Q of labor
B
ass. prod. L_2, tech
↑ in L
Y_2
A
ass prod. ($\bar{L}$, $\overline{tech}$) $L = L_1$
Y_1
capital prod 1
K_1
Q of Capital

b. (5 points) Return to the initial situation. Suppose that the government in this economy implements an effective minimum wage. Based upon the information you have been given and holding everything else constant, what happens to the following?



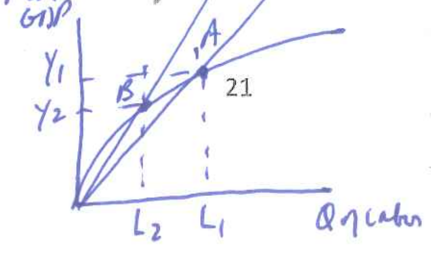
L^S
min wage
W_2
W_1
L^D
L_2
L_1

i. The equilibrium quantity of labor will ↓ L_1 to L_2

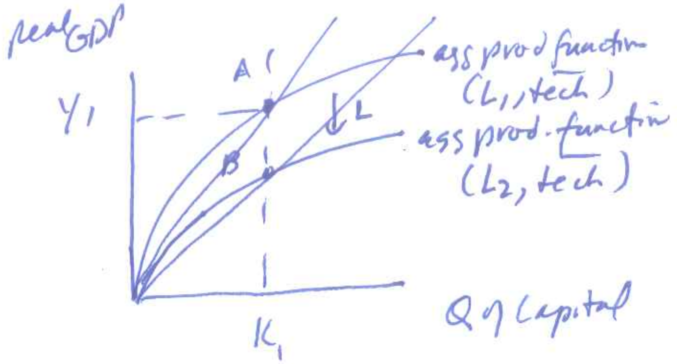
ii. The equilibrium wage rate will ↑ W_1 to W_2

iii. The level of real GDP produced in this economy will ↓

iv. Labor productivity will ↑ less L for given K ⇒ Y_2/L_2 ↑ relative to Y_1/L_1



real GDP
Y_1
Y_2
A
B
L_2
L_1
Q of Labor



v. Capital productivity will ______↓______

Answer:

i. The equilibrium quantity of labor will ______decrease________

ii. The equilibrium wage rate will ________increase__________

iii. The level of real GDP produced in this economy will ______decrease__________

iv. Labor productivity will ____increase______

v. Capital productivity will _______decrease_________

2. (worth a total of 10 points) You are provided the following information about the CPI in four different communities in 2016.

City	CPI in that City in 2016
Bigtown	120
Meritville	140
Econoland	90
Inspiration	110

a. (1 point) Given the above information, which city has the lowest purchasing power for a dollar in 2016?

Answer:
The city with the greatest CPI for a given time period will have the lowest purchasing power for a dollar: with high inflation you need more dollars to purchase an item than you would need with low inflation. So, Meritville is the city with the lowest purchasing power for a dollar in 2016.

b. (2 points) Suppose you wanted to get a sense of the difference in the cost of living between Bigtown and Meritville. If you had $90 in Bigtown, how many dollars would you need in Meritville to have the same real purchasing power? Show how you found your answer.

Answer:
In Bigtown a nominal amount of $90 is worth $75 in real dollars. So, to have $75 in real dollars in Meritville, what would the nominal amount need to be? A handy table summarizes these relationships and the computation you need to do.

City	Nominal Amount	CPI	Real Amount
Bigtown	$90	120	(90*100)/120 = $75
Meritville	$x	140	(x*100)/140 = $75

Solving for x, we get:

(x*100)/140 = $75
x = (75*140)/100 = $105
You would need $105 in Meritville to have the same purchasing power as $90 in Bigtown.

c. (4 points) Suppose that you are asked to redo the CPI index numbers so that Econoland becomes the "base community". That is, suppose you rescale the CPI index numbers so that Econoland now has a CPI of 100. What happens to the other index numbers? In your answer, round to the nearest whole number. Put your answers in the table below and show how you found your answers.

City	CPI originally	CPI with Econoland the "Base Community"
Bigtown	120	
Meritville	140	
Econoland	90	100
Inspiration	110	

Answer:

City	CPI originally	CPI with Econoland the "Base Community"
Bigtown	120	(120/90)*100 = 400/3 = 133
Meritville	140	(140/90)*100 = 156
Econoland	90	(90/90)*100 = 100
Inspiration	110	(110/90)*100 = 122

d. (3 points) Return to the initial information you were given. You have the following job offers in these four communities. You are asked to rank them from highest real salary to lowest real salary. Provide the formula you will use to do this ranking and then the ranking from highest to lowest. Show your work.

City	Salary Offer
Bigtown	$60,000
Meritville	$77,000
Econoland	$44,100
Inspiration	$54,450

i. The formula used for this computation is:

Answer:

real salary = [(nominal salary)*(scale)]/[CPI for the community]

ii. The ranking from highest real salary to lowest real salary is provided in the following table:

Cities Ranked from Highest Real Salary To Lowest Real Salary

Answer:

City	**Nominal Amount**	**CPI**	**Real Amount**
Bigtown	$60,000	120	(60,000*100)/120 = $50,000
Meritville	$77,000	140	(77,000*100)/140 = $55,000
Econoland	$44,100	90	(44,100*100)/90 = $49,000
Inspiration	$54,450	110	(54,450*100)/110 = $49,500

Here is the ranking of the real salaries in these cities:

Cities Ranked from Highest Real Salary To Lowest Real Salary
Meritville
Bigtown
Inspiration
Econoland