

Economics 102
Summer 2015
Second Midterm
Date: Monday, July 13, 2015

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 III) 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) _____

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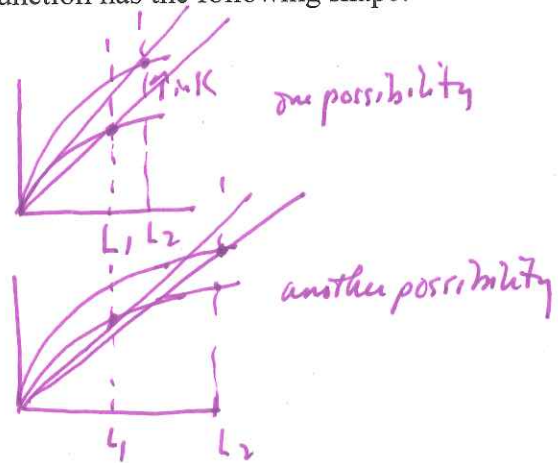
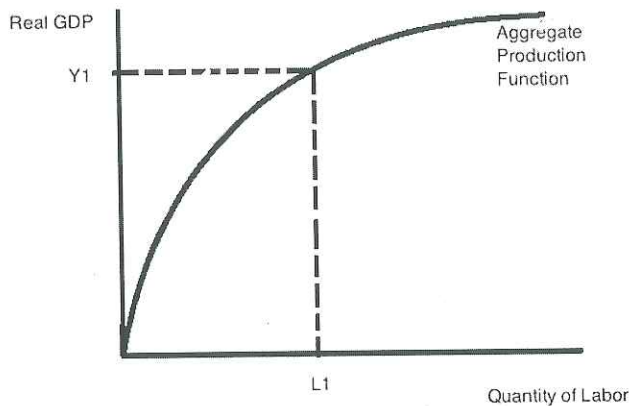
I. Binary Choice Questions: (10 Questions worth 2 points each for a total of 20 points)

1. Consider a situation where Jane has loaned Amanda \$10,000 for a year. A year from now Amanda pays Jane \$10,100. Given this information we can conclude that the nominal interest rate on this loan was _____ and that if inflation for the year proved to be 2% that _____ was better off.

- a. 10%; Amanda
- b. 1%; Amanda

$$\frac{10,000 \times .01}{10000} \Rightarrow \text{nomi rate} = 1\%$$

2. Consider the aggregate production function for Silvia, a small economy that is currently employing L_1 units of labor. This aggregate production function has the following shape:



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

- a. Labor productivity will increase while the level of real GDP for this economy may increase, decrease, or remain the same. *maybe not*
- b. Labor productivity may increase, decrease or remain the same while the level of real GDP for this economy will increase. *definitely ↑*

3. Eli left college in June 2014. During June and July Eli traveled about the American West before settling in Portland, Oregon. In August Eli was not working, was submitting job applications and was available to work. By December, Eli was still not working, and had not submitted a job application since mid-October. From this information we can conclude that in September Eli was considered _____ and by late December Eli was considered _____.

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

4. Real GDP in Smithville was constant in 2013 and 2014 while nominal GDP in 2014 was 50% greater than nominal 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.

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

- a. be very close or equal to 0% due to the elimination of cyclical unemployment.
- b. not approach 0% because of frictional and structural unemployment.

6. Joey loans Susie \$1000 for a year and they agree that Susie will pay Joey back the principle plus 10% interest on this loan. They each expect inflation to be 5% for the year. If actual inflation for this period is 4%, then _____ is better off.

- a. Joey
- b. Susie

4.

<u>Year</u>	<u>Nom GDP</u>	<u>real GDP</u>	<u>GDP deflator</u>
2013	e.s. 100	100	100
2014	150	100	150

\uparrow 50% \uparrow constant

$$\text{GDP deflator} = \frac{\text{nom (scale)}}{\text{real}}$$

$$\text{in 2014 } \text{GDP deflator} = \frac{150}{100} (100) = 150$$

6

real interest rate = nomi rate - expected inflation

Joey & Susie expect real interest rate of 5%
 but real interest rate ends up at 6% \Rightarrow lender (Joey)
 is better off, while borrower (Susie) is worse off

7. If government expenditures are less than tax revenues this implies that the government is:

- a. running a budget deficit.
- b. running a budget surplus.

$G < (Tax\ Revenues) \Rightarrow$ spending less than revenue \Rightarrow gov't running surplus

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

- a. increase.
- b. decrease.

9. Holding everything else constant, if the marginal propensity to save increases, this implies that the multiplier will:

- a. increase.
- b. decrease.

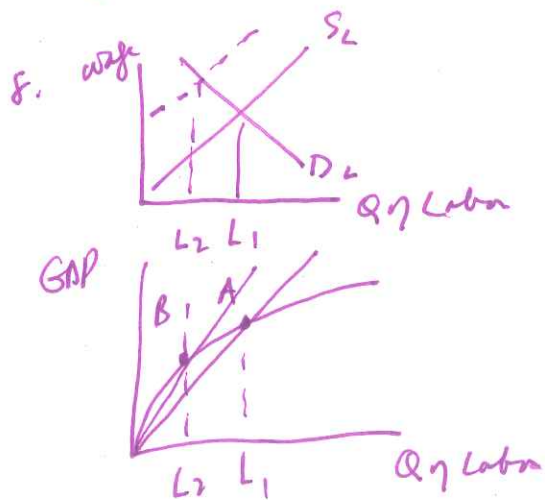
multiplier = $\frac{1}{1-MPC} = \frac{1}{MPS}$
 as MPS \uparrow , multiplier \downarrow

10. Suppose you are given the following information about the CPI for the economy of Southwood.

Year	CPI on a 100 point scale
2013	200
2014	150

From this information we can conclude that prices in general in Southwood fell by:

- a. 33% between 2013 and 2014.
- b. 25% between 2013 and 2014.



10. % rate of Δ in prices from 2013 to 2014

$$= \frac{150 - 200}{200} (100\%)$$

$$= \frac{-50}{200} (100\%)$$

$$= -25\%$$

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

11. Suppose that real GDP per capita in the United States is growing at 2.5% 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 \$10,000 while in the United States 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 U.S. citizens will still have a higher per capita real income than Indian citizens for the next 140 years. **X**
- b. Over time U.S. citizens will see their real income per capita increase but since real income per capita is growing more slowly in the U.S. than in India we can project that within a decade India's real income per capita will catch up and even surpass U.S. real income per capita. **X**
- c. Sometime between four and five decades from now, India's real income per capita will exceed U.S. real income per capita.**
- d. In a minimum of 70 years from now India's real income per capita will surpass U.S. real income per capita. **X**

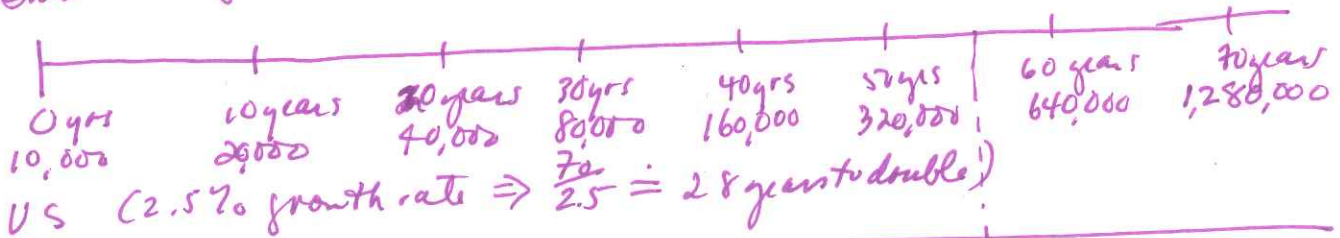
12. Suppose that Jackson's income in 2014 is \$50,000. His employer promises Jackson that he will get a real income increase of 2% for the coming year. Jackson and his employer agree that inflation for the year will run at 5%. Given this information, Jackson's nominal income for next year will be _____ and his real income measured in 2014 dollars will be _____.

- a. \$63,000 ; \$60,000
- b. \$453,550 ; \$52,500
- c. \$53,500 ; \$51,000**
- d. \$54,600 ; \$52,500

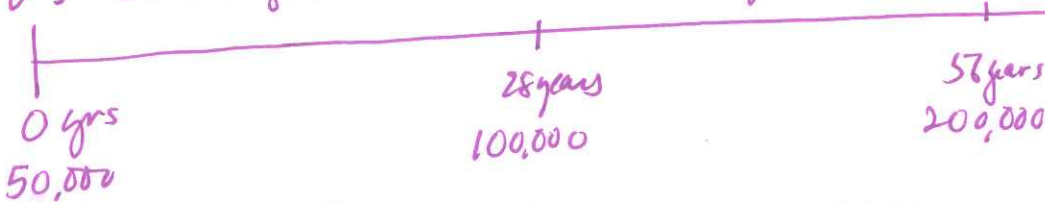
$$\begin{array}{r} 28 \\ 2.5 \overline{) 70} \\ \underline{50} \\ 20 \end{array}$$

11.

India (7% growth rate $\Rightarrow \frac{70}{7} = 10$ year to double)



US (2.5% growth rate $\Rightarrow \frac{70}{2.5} = 28$ years to double)



12. Needs 7% ↑ in nom income

$$\begin{array}{r} 50,000 \\ \times .07 \\ \hline 350000 \end{array} \Rightarrow \$53,500$$

$$\begin{array}{r} 50,000 \\ \times 1.02 \\ \hline 100000 \end{array}$$

real income in 2014 \$ must be \$51,000

13. Harold, who lives in Texas (part of the United States) goes to the store and purchases \$10 worth of Mexican beer, \$5 worth of corn tortillas produced in Mexico, \$8 worth of cheese produced in Wisconsin (part of the United States), \$4 worth of bananas from Costa Rica, \$10 worth of Colombian coffee, and \$18 worth of French wine. Assume that all of these goods were produced during this year. From this information, we can calculate that consumer spending in the United States GDP for this time period increased by _____, GDP in _____, and total imports for the United States due to this transaction are _____.

- a. \$55; Mexico increased by \$10; \$55
- b. \$8; Costa Rica increased by \$4; \$47
- c. \$55; the United States increased by \$8; \$47
- d. \$8; France increased by \$18; \$47

14. The actual rate of unemployment in an economy is currently at 8%. If frictional unemployment is 3.5% and structural unemployment is 2% when this country operates at full employment, then holding everything else constant, the cyclical unemployment rate for this economy is:

- a. 2.5%
- b. 13.5%
- c. 6%
- d. 4.5%

15. George anticipates that deflation will be 2% next year. He wants to earn a real return on his savings of 5%. Given this information, George should lend out his savings at a nominal interest rate of _____. If unanticipated inflation occurs George will be _____.

- a. 7%; better off
- b. 7%; worse off
- c. 3%; better off
- d. 3%; worse off

13. \$10 Mexican beer
 \$5 Mexican tortillas
 \$8 WI cheese
 \$4 Costa Rican bananas
 \$10 Colombian coffee
 \$18 Fr. Wine

$\$55 = C$

$\$47 = \text{Imports} = M$

$C - M = \text{US GDP}$

$\$55 - \$47 = \$8 = \text{US GDP} \Delta$
 given this transaction

14. frictional rate + structural rate = natural rate
 $3.5\% + 2\% = 5.5\%$ when $\%e \downarrow$
 cyclical unemployment rate = (actual unemployment rate) - (natural rate)

cyclical unemployment rate = $8\% - 5.5\% = 2.5\%$

15. real interest rate = (nominal interest rate) - (expected inflation)

$5\% = r\% - (-2\%)$

$5\% = r\% + 2\%$

$3\% = r\%$

16. The World Bank estimates that approximately 10% of U.S. real GDP is collected by the government through its tax collections. According to U.S. News and World Report the size of the underground or "shadow" economy is estimated to be between 8 to 14% of real GDP in the U.S. Economists believe that this shadow economy has grown in recent years due to the difficulty of finding legal employment for some individuals. (These are reasonably "accurate numbers" found by searching legitimate sources on the internet.) The U.S. Bureau of Economic Analysis reported that U.S. real GDP for 2013 was slightly less than \$16 trillion dollars. Given this information the underground economy costs the government taxing authorities to lose approximately:

- a. \$128 million dollars to \$224 million dollars last year.
- b. \$12.8 billion dollars to \$22.4 billion dollars last year.
- c. \$1.28 trillion dollars to \$2.24 trillion dollars last year.
- d. \$128 billion dollars to \$224 billion dollars last year.

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 10 hamburgers and 5 milkshakes.

	Quantity in 2013	Price in 2013	Quantity in 2014	Price in 2014
Hamburgers	20	8	25	4
Milkshakes	10	9	15	6

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

- a. Approximately 16.7%
- b. Approximately -16.7%
- c. Approximately -44%
- d. Approximately 44%

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

- a. 144.4
- b. 56.72
- c. 77.78
- d. 69.23

16. 8 to 14% of US GDP is underground economy
 US GDP in 2013 = 16,000,000,000,000 (16T\$)
 $\times .08$ & $\times .14$

Size of Underground economy \Rightarrow $\frac{64,000,000,000,000}{16}$

Total loss tax collections $\frac{128,000,000,000}{.10}$ to $\frac{224,000,000,000}{.10}$

\$128B to \$224B

Work space:

17. Market basket = 10 hamburgers
5 milkshakes

159
135

Year	Cost of market basket
2013	$(10)(8) + (5)(9) = 80 + 45 = 125$
2014	$(10)(4) + (5)(6) = 40 + 30 = 70$

Year	CPI: BY 2013
2013	$\frac{125}{125}(100) = 100$
2014	$\frac{70}{125}(100) = \frac{70(4)}{5} = \frac{14(4)}{1} = 56$

$$\text{Rate of inflation} = \left[\frac{56 - 100}{100} \right] (100\%) = -44\%$$

18. Year	Nom GDP	Real GDP (BY=2013)
2013		
2014	$(25)(4) + 15(6) = 190$	$8(25) + 9(15) = 335$

GDP deflator (BY 2013)

2013

2014

$$\frac{190}{335}(100) = \frac{38(100)}{67} = \frac{3800}{67} \approx$$

$$\begin{array}{r} 5 \\ 67 \overline{) 3800} \\ \underline{335} \\ 450 \end{array}$$

... can I stop here & go with answer (6)?

$$\begin{array}{r} 56 \\ 67 \overline{) 3800} \\ \underline{335} \\ 450 \\ \underline{402} \\ 48 \end{array}$$

19. Maurice is graduating at the end of summer school and is delighted that he has gotten four job offers. All four job offers are for similar work and Maurice's only criterion for accepting a job is that it happens to be in St. Paul since he has fallen in love with all that the Twin Cities offers. However, Maurice's parents view this decision from a somewhat different perspective: they want Maurice to take the job that has the highest salary for next year (this single year perspective is meant to simplify the analysis). So, here are Maurice's job offers and he needs your help in evaluating the choices.

Job Offer	Annual Salary
Job in New York City	\$100,000
Job in Chicago	\$80,000
Job in San Francisco	\$120,000
Job in St. Paul	\$70,000

Maurice in his Economics class learned the importance of looking at real purchasing power so he first tells his 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 Maurice collects data on the CPI for these four communities and finds the following data.

City	CPI for this year
New York City	100
Chicago	80
San Francisco	115
St. Paul	65

Real Salary
 $(100,000/100)(100) = 100,000$
 $(80,000/80)(100) = 100,000$
 $(120,000/115)(100) =$
 $(70,000/65)(100) =$
 These are equivalent

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

a. San Francisco, St. Paul, and New York and Chicago (last two are equivalent); no, St. Paul will not satisfy Maurice's parents

b. St. Paul, San Francisco, and New York and Chicago (last two are equivalent); yes, St. Paul is an option

c. New York and Chicago are equivalent, San Francisco, and St. Paul; no, St. Paul is not offering a competitive real salary

d. New York and Chicago are equivalent; San Francisco, and St. Paul; yes, Maurice's parents will fuss but ultimately let their son have his way since these four offers are very close to one another in terms of real purchasing power

San Francisco:

$$\frac{120,000}{115} \left(\frac{100}{100}\right) = \frac{2400,000}{23} \Rightarrow \text{more than } \$100,000 \Rightarrow \text{better than NY or Chicago}$$

St. Paul

$$\frac{70,000}{65} \left(\frac{100}{100}\right) = \frac{1,400,000}{13} \Rightarrow \text{more than } \$100,000 \Rightarrow \text{better than NY or Chicago}$$

Note: I am trying to avoid this calculation! But, it turns out I need it => so look on next page

Work space:

San Francisco

$$\begin{array}{r} 104,347 \\ 23 \overline{) 2,400,000} \\ \underline{23} \\ 100 \\ \underline{92} \\ 80 \\ \underline{69} \\ 110 \\ \underline{95} \\ 180 \\ \underline{161} \\ 19 \end{array}$$

St. Paul

$$\begin{array}{r} 107, \dots \\ 13 \overline{) 1,400,000} \\ \underline{13} \\ 100 \\ \underline{91} \end{array}$$

↳ no need to go further!!

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

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

$$Y = 5K^{1/2}L^{1/2}$$

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:

$$\text{Demand for Labor: } L = 1000 - 50W$$

$$\text{Supply of Labor: } L = 50W - 200$$

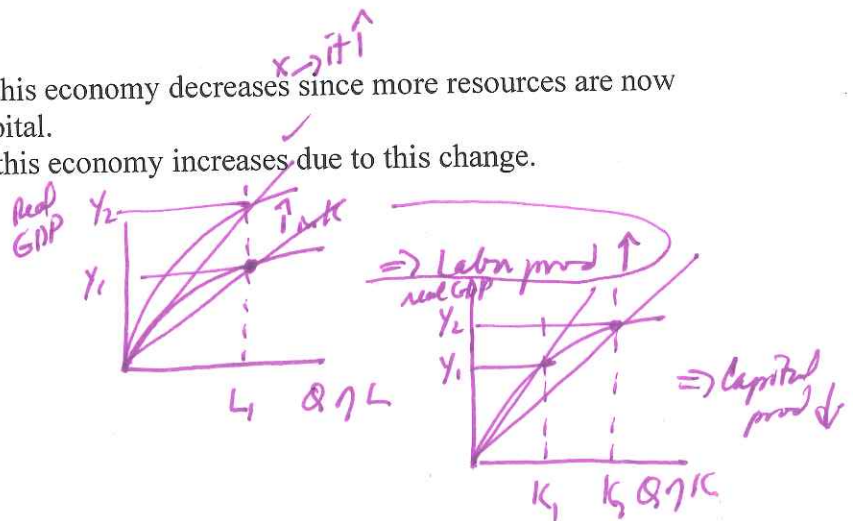
You are also told that capital in this economy is initially equal to 16 units.

20. Given the following information, which of the following statements is true?

- a. The equilibrium amount of labor in this economy is 20 units of labor and the value of real GDP is 400.
- b. The equilibrium amount of labor in this economy is 400 units of labor and the value of real GDP is 8000.
- c. The value of capital productivity in this economy is 1/25 units of output per unit of capital and the value of real GDP is 400.
- d. The equilibrium amount of labor in this economy is 400 units of labor and the value of capital productivity is 25 units of output per unit of capital.

21. Suppose the amount of capital in this economy increases while holding everything else constant. Given this change, which of the following statement it true?

- a. Labor productivity decreases.
- b. Capital productivity increases.
- c. The level of real GDP produced in this economy decreases since more resources are now being devoted to the production of capital.
- d. The level of real GDP produced in this economy increases due to this change.



$$Y = 5\sqrt{K}\sqrt{L}$$

$$K = 16 \Rightarrow \sqrt{K} = 4$$

$$Y = 20\sqrt{L}$$

$$1000 - 50W = 50W - 200$$

$$1200 = 100W$$

$$12 = W$$

$$L = 1000 - 50(12)$$

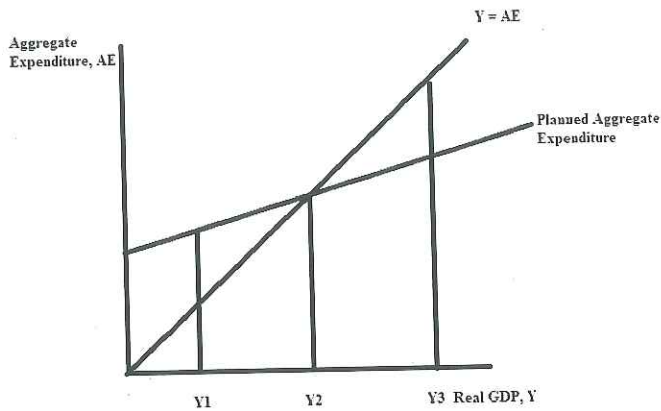
$$L = 1000 - 600 = 400 \text{ (note that this is a perfect square!)}$$

$$\text{if } L = 400 \Rightarrow \sqrt{L} = 20$$

$$Y = 20 \cdot 20 = 400$$

$$\text{Capital productivity} = \frac{Y}{K} = \frac{400}{16} = \frac{100}{4} = 25 \text{ units of output/unit of capital}$$

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



You are told that this economy currently has positive inventories and given this information and this graph you conclude that this economy is producing at:

- a. Y_1
- b. Y_2
- c. Y_3
- d. some level of real GDP that cannot be qualitatively identified from the provided information.

If inventories are $\oplus \Rightarrow$ Spending $<$ Production
 $AE < Y \Rightarrow$ this occurred at Y_3

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

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

Government Spending = \$200

Taxes = \$120

Transfers = \$0

Investment Spending = \$50

Consumption Spending = C and can be described by the equation $C = 100 + .75(Y - T)$

where T is taxes and Y is real GDP

Net Exports = \$50

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

- I. This country's government is operating with a budget surplus. $X \Rightarrow G < T ? G = 200, T = 120 \Rightarrow \text{Budget Deficit}$
- II. This country has a trade deficit. $X, X - M > 0 \text{ trade surplus} \Rightarrow X - M = 50 \Rightarrow \text{Trade Surplus}$
- III. This country has more exports than imports. ✓
- IV. The tax expenditure multiplier for this country equals -3. ✓ $\text{tax exp multiplier} = \frac{-b}{1-b} = \frac{-.75}{.25} = -3$

- 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.

24. Given the above information suppose that government spending increases by \$100. If this is the only change, what will be the change in real GDP?

- a. an increase of \$400
- b. a decrease of \$400
- c. an increase of \$300
- d. a decrease of \$300

$$\Delta Y = \left(\frac{1}{1-b} \right) \Delta G$$

$$\Delta Y = \frac{1}{.25} (100)$$

$$\Delta Y = 4(100) = 400$$

Alternatively

In eq.

$$Y = C + I + G + (X - M)$$

$$Y_e = 100 + .75(Y_e - 120) + 50 + 200 + 50$$

$$.25Y_e = 400 + (-90)$$

$$Y_e = \frac{310}{.25} = 1240$$

$$Y' = C + I + G' + (X - M)$$

$$Y_e' = 100 + .75(Y_e' - 120) + 50 + 300 + 50$$

$$.25Y_e' = 500 + (-90)$$

$$.25Y_e' = 410$$

$$Y_e' = \frac{410}{.25} = 1640$$

$$\Delta Y_e = Y_e' - Y_e = 1640 - 1240 = 400 !!$$

$$\begin{array}{r} 1240 \\ .25 \overline{) 31000} \\ \underline{2500} \\ 1600 \\ \underline{1500} \\ 1000 \\ \underline{1000} \\ 0 \end{array}$$

$$\begin{array}{r} 1640 \\ .25 \overline{) 41000} \\ \underline{2500} \\ 1600 \\ \underline{1500} \\ 1000 \\ \underline{1000} \\ 0 \end{array}$$

Use the following information to answer the next two (2) questions. Base your answers here on the Rule of 70 discussed in class.

Marjorie is getting ready to invest her inheritance into a fund to help finance her grandchildren's education. She has the following choices:

Fund One: She deposits \$20,000 today and this fund pays 2% a year for the next 35 years. After that the fund pays no return on the amount in the fund.

Fund Two: She deposits \$15,000 today and this fund pays 2.5% a year for the next 28 years. After that the fund pays no return on the amount in the fund.

Fund Three: She deposits \$12,000 today and this fund pays 7% a year for 30 years. After that the fund pays no return on the amount in the fund.

25. Given these options, if Marjorie only cares about the highest accumulated amount in the fund, which option is her best one?

- a. Fund One
- b. Fund Two
- c. Fund Three
- d. Fund One and Fund Three are equivalent

26. If Marjorie goes with Fund Three in twenty years the accumulated funds in this account will approximately equal:

- a. \$12,000
- b. \$24,000
- c. \$48,000
- d. \$96,000

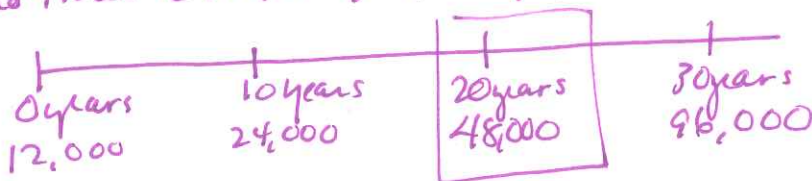
Fund One (\$20,000; 2% a year $\Rightarrow \frac{70}{2} = 35$ years to double)



Fund Two (\$15,000; 2.5% a year $\Rightarrow \frac{70}{2.5} = 28$ years to double)



Fund Three (\$12,000; 7% a year $\Rightarrow \frac{70}{7} = 10$ years to double)



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: $Q = 10,000 - 500r$

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: $Q = 500r - 1000$

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.

27. Given this information and holding everything else constant, if the government decides to run a surplus of \$1000 we know with certainty that:

- a. The equilibrium interest rate in the loanable funds market will be greater than 11% and that the level of private investment will be equal to 5000. *possible ✓*
- b. The equilibrium interest rate in the loanable funds market will be equal to 10% and that the level of private investment will be equal to 5000. *possible ✓ (see notes below)*
- c. The equilibrium interest rate in the loanable funds market will be less than 11% and that the level of private saving will be less than 4000. *possible ✓ (see below)*
- d. The equilibrium interest rate in the loanable funds market will be less than 11% and that the level of private investment will be less than 4000. *X*

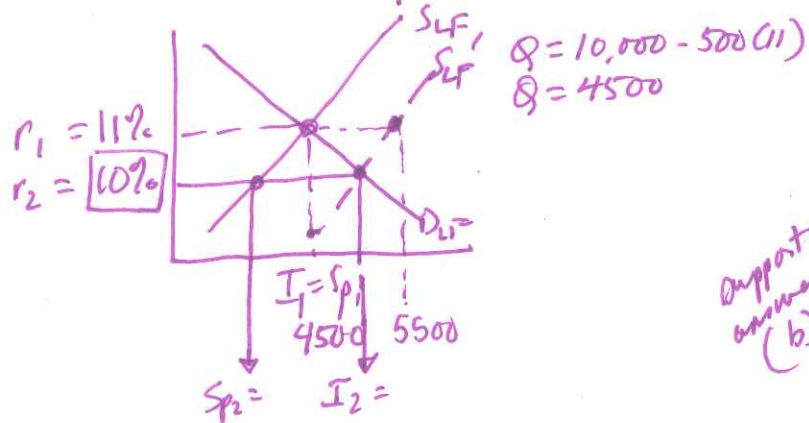
→ level of private investment must be > 4500

28. Given the initial information, if the government decides to run a deficit of \$1000 we know, holding everything else constant, that:

- a. Private investment will be crowded out by \$500. *(no need to do this calculation - reject other answers & save time !!)*
- b. Private investment will increase by \$500 from its original level. *X I ↓ from I₁ to I₂*
- c. Private investment will be unaffected by the government running a surplus. *X I ↓ from I₁ to I₂*
- d. The decrease in private investment that occurs is due to an increase in household consumption. *X*

27. Budget surplus ⇒ S_{LF} shifts right ⇒ r ↓, I ↑, S_p ↓

Initially
 $10,000 - 500r_1 = 500r_1 - 1000$
 $11,000 = 1000r_1$
 $r_1 = 11\%$



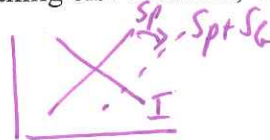
From the graph I know
 $I_2 > 4500$ but $I_2 < 5500$
 $S_{p2} < 4500$
 $r_2 < r_1 ⇒ r_2 < 11\%$
↳ w/ this reasoning we eliminate answers (a) and (d)

S_{LF}' : Q = 500r₂
 $10,000 - 500r_2 = 500r_2$ finding new eq.
 $10,000 = 1000r_2$
 $r_2 = 10\%$
 $I_2 = 10,000 - 500(10) = 5000$
 $S_{p2} = 500(10) = 5000$ } *answer (c) is not true*

supports answer (b)

29. Suppose an economy is at full employment. Holding everything else constant, when the government runs a surplus this results in:

- a. A decrease in private saving. ✓
- b. An increase in private saving. ✗
- c. A decrease in consumption by households. ✗
- d. Answers (a) and (c) are both correct.



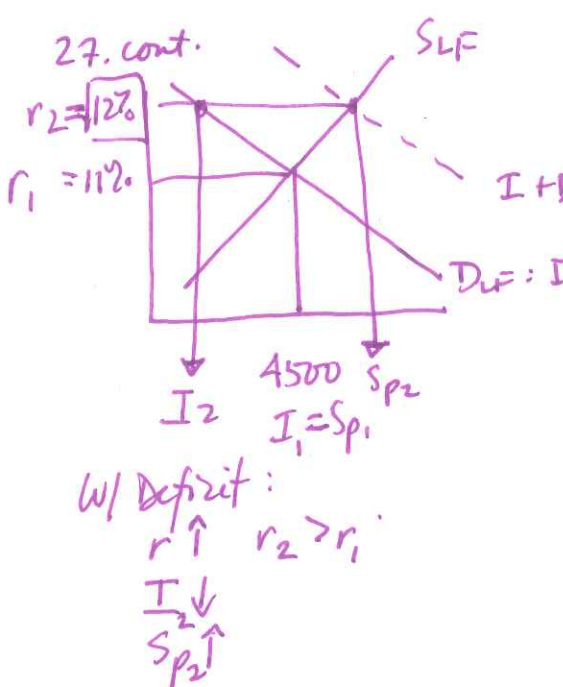
$r \downarrow \Rightarrow Sp \downarrow \Rightarrow C \uparrow$
 $I \uparrow$

30. Consider a community that has ten individuals:

- Mary who is 38 and works fifteen hours a week at a local coffee shop
- Roscoe who is 25 and works twenty hours a week at a local restaurant
- Sharon who is 15 and who is looking for a job: she is available to work and she is applying for jobs
- 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
- Tammy who is 54 and is currently unhappily employed as a CPA
- Rochelle who is 29 and who has recently returned to school to study mechanical engineering full-time
- Albert who is 52 and who has recently lost his job due to changes in the technology used to produce widgets: Albert is looking for work, available to work, and is applying for jobs
- Jo-Jo who is 17 and works part-time for ten hours a week at the local mall
- Maria who is 33 and owns and operates a large plumbing business
- Xun who is 44 and works for a bakery fifty hours a week

Given the above information, the labor force participation rate is equal to _____ and the unemployment rate is equal to _____. Round to the nearest whole number for both answers.

- a. 80%; 33%
- b. 80%; 25% ✓
- c. 89%; 25% ✓
- d. 100%; 25%



$DUF: Q' = 11,000 - 500r$
 $SUF: Q = 500r - 1000$

$11,000 - 500r_2 = 500r_2 - 1000$
 $r_2 = 12\%$

$I_2 \Rightarrow I_2 = 10,000 - 500(12)$
 $I_2 = 4000$

$\Delta I = I_2 - I_1$
 $\Delta I = 4000 - 4500$
 $\Delta I = -500$

30.

Mary $\Rightarrow E$
 Roscoe $\Rightarrow E$
 Sharon $< 16 \Rightarrow$ not in LF
 Mitchell $\Rightarrow U$
 Tammy $\Rightarrow E$
 Rochelle \Rightarrow not in LF
 Albert $\Rightarrow U$
 Jo-Jo $\Rightarrow E$
 Maria $\Rightarrow E$
 Xun $\Rightarrow E$

$LF = \frac{U + E}{\text{adult pop.}} (100\%)$
 $= \frac{2 + 8}{9} (100\%)$
 $= \frac{8}{9} (100\%) = 89\%$

$Urate = \frac{U}{U + E} (100\%)$
 $= \frac{2}{8} (100\%) = 25\%$

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:

$$Y = 20K^{1/2}L^{1/2}$$

Furthermore, in this economy you know that the level of capital is constant and equal to 25 units. You also know that the labor market for this economy can be described by the following equations where L is the number of units of labor and W is the wage rate:

$$\text{Labor Demand Equation: } L = 800 - 10W$$

$$\text{Labor Supply Equation: } L = 20W - 400$$

a. (1 point) Given the above information, what is the equilibrium wage rate and the equilibrium level of employment in this economy? Show how you found your answer for full credit.

$$\begin{aligned} 800 - 10W &= 20W - 400 \\ 1200 &= 30W \\ W_e &= 40 \\ L_e &= 800 - 10(40) = 400 \\ \text{or } L_e &= 20(40) - 400 = 400 \end{aligned}$$

b. (1 point) Given the above information, calculate the full employment level of real GDP. You can assume that when the labor market is in equilibrium that the full employment level of labor is being hired. Show your work for full credit.

$$\begin{aligned} Y &= 20\sqrt{K}\sqrt{L} \\ Y &= 20(5)(20) \\ Y &= 400(5) = 2000 \end{aligned}$$

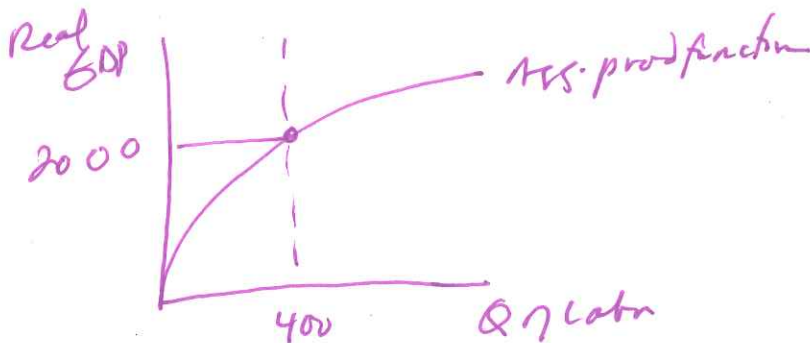
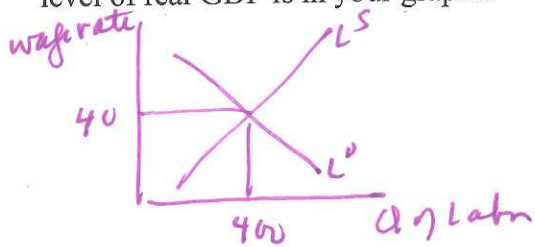
c. (2 points) Calculate the value of labor productivity when this economy is at its full employment level of real GDP. Provide any formulas you use in making this calculation. Show your work for full credit. In your answer provide the units of measurement for this calculation as well as the numeric value.

$$\text{Labor productivity} = \frac{\text{output}}{\text{labor}} = \frac{2000}{400} = 5 \text{ units of output/unit of labor}$$

d. (2 points) Calculate the value of capital productivity when this economy is at its full employment level of real GDP. Provide any formulas you use in making this calculation. Show your work for full credit. In your answer provide the units of measurement for this calculation as well as the numeric value.

$$\text{Capital productivity} = \frac{\text{output}}{\text{capital}} = \frac{2000}{25} = 80 \text{ units of output/unit of capital}$$

e. (2 points) In the space below draw two graphs indicating in the first graph the labor market and in the second graph this economy's aggregate production function. Label all axes, all curves, and all significant points in these two graphs. Make sure you indicate where the full employment level of real GDP is in your graphs.



f. (2 points) Suppose that capital decreases to 16 units. If there are no changes in the labor market, what will be the new full employment level of real GDP? Calculate the new level of capital productivity and provide a verbal explanation of what has happened to capital productivity.

$$Y' = 20\sqrt{K'}\sqrt{L}$$

$$Y' = 20\sqrt{16}\sqrt{400}$$

$$Y' = 20(4)(20) = 1600$$

$$\text{Capital productivity} = \frac{1600}{16} = 100 \text{ units of output/unit of capital}$$

w/ less capital for a given amt of labor, capital productivity has ↑ ⇒ capital being used more intensively

2. (Worth a total of 10 points) Use the following information to answer this set of questions. The table below provides some data on the production of goods in 2012, 2013, and 2014 in Malvia, a small economy. For this problem assume that Malvia produces only tarts, gadgets and marbles. In Malvia the market basket is defined as 10 tarts, 5 gadgets, and 20 marbles.

	2012	2013	2014
Quantity of Tarts	40	60	50
Price of Tarts	\$1	\$2	\$2
Quantity of Gadgets	50	60	50
Price of Gadgets	\$4	\$2	\$4
Quantity of Marbles	30	20	30
Price of Marbles	\$2	\$3	\$3

a. (3 points) Calculate the cost of the market basket in Malvia for 2012, 2013, and 2014. Provide a general formula for the cost of the market basket and once you calculate your values place your answers in the following table.

Year	Cost of Market Basket
2012	\$70
2013	\$90
2014	\$100

cost of mkt basket:

$$(10 \text{ tarts})(\text{Price of tart in } CY) + (5 \text{ gadget})(\text{Price of gadget in } CY) + (20 \text{ marbles})(\text{Price of marbles in } CY) = \text{cost of mkt basket in } CY$$

2012

$$(10)(1) + (5)(4) + (20)(2) = 10 + 20 + 40 = 70$$

2013

$$(10)(2) + (5)(2) + 20(3) = 20 + 10 + 60 = 90$$

2014

$$(10)(2) + (5)(4) + 20(3) = 20 + 20 + 60 = 100$$

b) (3 points) Calculate the values of the CPI for 2012, 2013, and 2014 using 2014 as the base year and a 1 point scale. Provide a general formula for calculating the value of the CPI for year n and then once you calculate your values place your answers in the following table.

Year	CPI with base year 2014 using a one point scale
2012	$(70/100)(1) = .7$
2013	$(90/100)(1) = .9$
2014	$(100/100)(1) = 1$

$$CPI = \left(\frac{\text{cost of mkt basket in Current Year}}{\text{cost of mkt basket in base year}} \right) (\text{Scale})$$

$$CPI \text{ in } PY = \text{scale} = 1$$

c) (4 points) Calculate the value of real GDP for 2012, 2013, and 2014 using 2014 as the base year. Provide a general formula for real GDP and once you calculate your values place your answers in the following table.

Year	Real GDP with 2014 as the base year
2012	370
2013	420
2014	390

$$\text{real GDP} = \sum_{i=1}^n P_i^{BY} Q_i^{CY}$$

2014 is base year \Rightarrow 50 prices from 2014

$$\text{Real GDP 2012} = 40(2) + 50(4) + 30(3) = 80 + 200 + 90 = 370$$

$$\text{Real GDP 2013} = 60(2) + 60(4) + 20(3) = 120 + 240 + 60 = 420$$

$$\text{Real GDP 2014} = 50(2) + 50(4) + 30(3) = 100 + 200 + 90 = 390$$