

Place your name on the back of this sheet of paper and nowhere else. Staple your answers face up on the front of this sheet of paper. Failure to follow these directions will cost you 10 points. Your assignment will be typed, except graphs can be drawn by hand and mathematical equations can be done by hand. Failure to type it will cost you 10 points. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

1) (15 points) To retire and keep your standard of living, you need to save 20 times your annual income. Suppose your retirement fund earns 6% interest and if you earn \$50,000/year. If you save for 40 years, you need to save \$502.14/month. If you save for 30 years, you need to save \$1070.05/month. There are two reasons why the extra 10 years greatly reduces how much you have to save. What are the two reasons? Explain your logic. (Note that this means you should start saving for retirement today.)

The first reason is compounding of interest. Since 6 divides evenly into 72 but not 70, I will use the rule of 72. At 6% interest, it will double in $72/6 = 12$ years. So \$1 saved in year 1 and held for 40 years will double $40/12 = 3\frac{1}{3}$ times and will become about \$10.28. However, \$1 saved 10 years from now will only compound $30/12 = 2\frac{1}{2}$ times and will become about \$5.74. Secondly, if you are saving for 40 years rather than 30, you are making more payments, thus each one can be smaller. Instead of spreading it out over 1040 payments (40 years of biweekly payments), you will be spreading it out of 840 payments (30 years of biweekly payments).

2) (10 points) Explain how enforcing property rights helps a country to grow faster.

Enforcing property rights means that the owner of the property is not afraid that the government or somebody else will take it from them. This means they will benefit from any improvement like a new building or renovating the building. So, they are more likely to develop the property and produce more in the future. Similarly, intellectual property rights protect artistic projects and patents. Without protection, people will be afraid they will not benefit from the work to develop the intellectual property. Therefore, they are less likely to produce the art or create an invention.

3) (15 points) Having a patent last longer has both a good effect on the economy and a bad effect on the economy. Explain both effects.

The longer a patent lives, the longer the company has a monopoly. Monopolies hurt the economy by producing too little and charging too much. So, longer lived patents are bad for the economy. However, if they have a monopoly for longer, then they make more profits. Therefore, they have more incentive to invent because they will get more profits from each invention. More inventions helps the economy because we get better products.

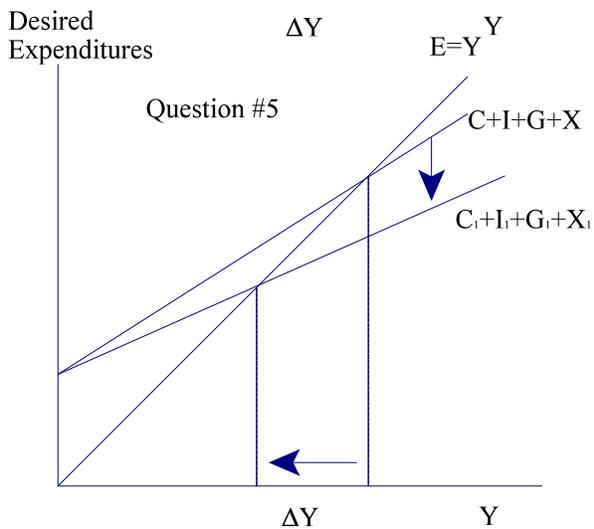
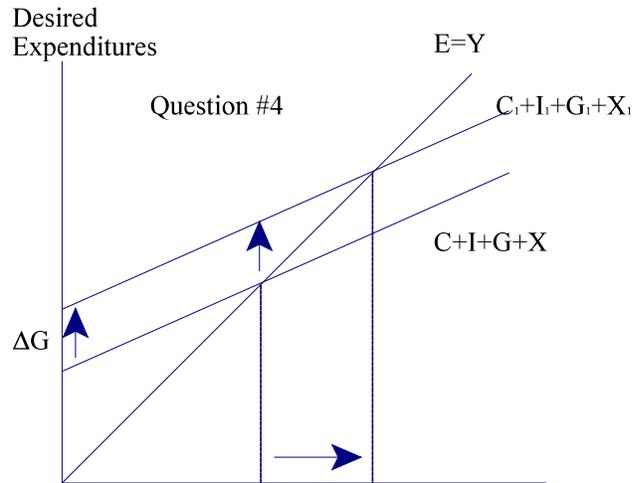
4) (25 points) Draw the Keynesian Cross diagram, a.k.a. 45° diagram. Illustrate the effects of an increase in government spending. Explain why the curve(s) moved as drawn. Given the diagram, how much do you estimate the size of the government spending multiplier to be? Explain your logic.

Government spending is one part of the total demand for goods and services, so an increase in government spending will move the $C+I+G+X$ line up. (See graph on the next page.) The government spending multiplier is $\Delta Y/\Delta G$. On the graph, that looks like it is about 2. **Note**, the

formula $1/(1-MPC)$ can work but is a much less accurate way of doing it. If there are any problems with the graph, the number will be way off. So, as I said in class, you should not use that formula for the graphs, even if you can estimate the MPC from the slope of the graph.

5) (20 points) Draw the Keynesian Cross diagram, a.k.a. 45° diagram. Illustrate the effects of an increase in marginal propensity to consume. Explain why the curve(s) moved as drawn.

The MPC is the slope of the $C+I+G+X$ line. So, the curve gets flatter. It also decreases because if you are spending less out of your income, then there is less demand for goods and services at all points except when there is no income. So, all points move down except for the vertical intercept. **Note**, you cannot just say it gets flatter because there are more than one way to get flatter. It could move the vertical intercept up but keep the last point constant. That would make it flatter, but would be wrong. **Like all questions involving this diagram and all movements of the AD curve on the SRAS/LRAS/AD diagram, you need to discuss what is happening to the total demand for goods and services.** You cannot say, "It moved up because GDP went up." The change in GDP is the result – not the cause – of the curve moving.



6) (15 points) When we estimated the size of the government spending multiplier, we implicitly made some assumptions. What did we implicitly assume about taxes? If we relaxed that assumption, what would happen to the size of the multiplier? Explain your logic. Like virtually all unstated assumptions, we assumed *ceteris paribus*. That means that tax payments are unaffected by the spending. In reality, (i.e. relaxing the assumption), when people get more income, they pay more income tax. This reduces the amount of money they can spend. That will reduce the income of the next person and they pay taxes, so they do not spend as much. Therefore, the total change in GDP is smaller when the assumption is relaxed. Therefore, the multiplier, $\Delta Y/\Delta G$ will be smaller. **Note**, because we do not have a balanced budget requirement, nothing in economics causes government spending to change. Even if it did cause government spending to increase, that increase in G would have no impact upon $\Delta Y/\Delta G$ because Y and G grow proportionately.