## **Review for Midterm**

Eco 10350, Prin of Macro, Kevin R Foster, Colin Powell School at CCNY

As per syllabus, Chapters 1-10 of OpenStax textbook, all of Dasgupta, plus all lecture material

Particular Topic Areas:

- Rule of 70 problems
- Annualizing rates of growth
- Budget set, opportunity cost
- PPF
- Elasticity
- Supply & Demand
- Nominal/real GDP calc; GDP deflator
- Calc unemployment, inflation
- Y = C + I + G + (X M)
- Solow growth decomposition
- Prisoner's dilemma
- Trade, comparative advantage

## Here is beginning of exam:

## Midterm Exam

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The questions are worth 90 points. You have 90 minutes to do the exam, one point per minute.

Answers may be submitted electronically or in blue books. If you mix your answers, please note that, so computer file says "See blue book for Q#" and blue book says "See computer file for Q#". Please submit all relevant computer files. Please no "pages" files, save as pdf or rtf. No need to put your name, just last digits of ID to identify yourself, so grading is blind. You may refer to your books, notes, calculator, computer, or astrology table. The exam is "open book." However, you must not refer to anyone else (any Turing-class intelligence), either in person or electronically, during the exam time! Please silence all electronic noisemakers such as mobile phones.

You must do all work on your own. Cheating is harshly penalized. Good luck. Stay cool.

## Sample Problems

 Using Rule of 70, how long does it take to double your investment at interest rate of 1%, 2%, 2.5%, 3.75%, 5%?

- Using Rule of 70, how long does it take for GDP to double if growth is 4%? 4.25%?
  4.35%? How much change in time-to-doubling is created by a 10-bps increase in GDP, if it starts from 4% or 6% or 8%?
- 3. Using Rule of 70, how long does it take for a 4x increase in initial investment if interest rate is 4%, 5% or 4.33%?
- 4. Using Rule of 70, if GDP doubled in 8 years, what was the rate of growth over that time? If it doubled in 10 years? 12 years?
- 5. Using Rule of 70, if initial investment quadrupled (4x) in 10 years or 9 years or 8.5 years, what was the interest rate?
- 6. If a macro variable (inflation, retail sales, residential investment, whatever) grew by 0.1% in a month, what was annual rate? What about 0.2%, 0.3%, 0.4%?
- 7. If a macro variable grew at an annualized rate of 2%, what was the monthly growth? If annualized rate was 3%, 3.5%, 4%?
- 8. If a macro variable grew by 0.2% in a quarter, what was annual rate? What about 0.3%, 0.4%, 0.5%, 1%?
- 9. If a macro variable grew at an annualized rate of 2%, what was the quarterly growth? If annualized rate was 3%, 3.5%, 4%?
- 10. A consumer chooses between two goods, X & Y, where Px = 10 and Py = 5. The consumer has income of 100 to spend on the goods. Sketch the budget set. Show the effects of a change of 1 (up or down) in Px or Py. What happens to the opportunity cost of X and of Y in each case?
- 11. Assume an economy can make 2 outputs X & Y by dedicating its input, W, to either. It is constrained that input used for X, Wx, and input used for Y, Wy, must sum to 100 so Wx + Wy = 100. Model the output of X as  $X = \sqrt{W_x}$  and of Y as  $Y = \sqrt{W_Y}$ . Sketch the PPF and opportunity costs of X and Y find the values of X and Y if (Wx, Wy) = (100,0) or = (0,100) or (50,50) or (25,75) or (65,25). You might be able to derive the function for PPF. Re-do if technological change makes the x-process more efficient so  $X = \sqrt{2W_x}$ .
- 12. If a good has demand elasticity of 0.2, what is the price change if supply changes by 3%? (up or down) What if demand elasticity is 0.7 or 1 or 1.5? Give examples of goods that might have such elasticities.
- 13. If a good has supply elasticity of 0.2, what is the price change if demand changes by 3%? (up or down) What if demand elasticity is 0.7 or 1 or 1.5? Give examples of goods that might have such elasticities.
- 14. If a good, X, has a cross-price elasticity of 0.5 with another good, Y, what is the effect on demand for X if price of Y increases by 10%? What if cross-price elasticity is –0.5? Give examples of goods that might have such elasticities.
- 15. A supply curve can be represented as Q = P while demand is Q = 100 P. What is the equilibrium price and quantity? What is the elasticity of small changes around this equilibrium point? What if supply changes to Q = 2P? To Q =  $\frac{1}{2}P$ ? What sort of event might lead to each change? What if demand changes to Q = 80 P or Q = 120 P? What event might lead to those changes? What if supply went to Q = 10 + P or Q = -10 + P? If demand went to Q = 100 2P or Q = 100  $\frac{1}{2}P$ ? Consider the general system of supply Q = A + BP and demand Q = C DP?

16. Calculate nominal and real GDP, GDP deflator and CPI for the following cases:

	2016		2017		2018	
	Р	Q	Р	Q	Р	Q
Good A	10	14	11	15	11	16
Good B	12	12	13	13	13	13
Good C	14	10	15	11	13	10
Good D	25	3	22	3	25	3

If CPI includes all goods, does CPI inflation match GDP deflator inflation? If CPI excludes D, what is the difference? If it excludes A?

- 17. If there are 200 people in the population, 100 in the labor force, and 5 unemployed, what is the LFP and unemployment rate? If 10 more people join the labor force but 8 of those immediately find jobs, what is the change in LFP and UR?
- 18. The CPI for 2014-2018 is 105, 108, 112, 115.5, and 118.33. Calculate inflation in each year.
- 19. Consumption is 100, residential investment is 10, nonresidential investment is 13, there is no change in business inventory, government spending is 15, exports are 20 and imports are 25. What is GDP? What if the trade balance gets worse as exports fall by 1 and imports rise by 1 (assuming for now that the other parts don't change)?
- 20. Give an example of two individuals where each has a comparative advantage in producing good X or Y. Can you show where one has an absolute advantage but the other still has a comparative advantage? Can you show a case where one has no comparative advantage in either good?
- 21. We've estimated that in the recent past, every 1% change in a country's capital (K) produces a 0.4% change in GDP and every 1% change in their labor force (L) produces a 0.6% change in GDP. Each 1% change in technology (A) produces a 1% change in GDP. What would you predict then, if K grows by 5%, L grows by 3%, and A grows by 2%? What if K grows by 6%? If L grows by 2%? If A grows by 1%?
- 22. Construct your own example of a Prisoner's Dilemma game where each side can choose to either cooperate or defect. Can you show an example where cooperation is chosen by both sides? Where cooperate is chosen by one but defect is chosen by the other? Where both choose to defect?