COURSE 180.101
MACROECONOMICS
EXAM #2 (Two Hours) **NOVEMBER 7th, 2017**

NAME_____ **TA***_____

***Two extra points if you remember to write down the name of your TA**

Section I: Multiple Choice (20 points)

1. Social Security + Health Care Costs + Defense + Interest Payments make up roughly what percent of U.S. Federal Spending?
   a. 10% b. 40% c. 60% **d. 80%** e. 90%

2. William Nordhaus received the Nobel Prize for his work creating the DICE model, a framework designed to evaluate the benefits and costs of what?
   a. Cutting income taxes **b. reducing $C0_2$ emissions** c. targeting M1 d. targeting the $/Yen

3. What was the month-to-month rise for U.S. non-farm payrolls, for October 2018?
   a. 1 million b. 100 thousand c. 2.5 million **d. 250,000**

4. What was the U.S. unemployment rate in October of 2018?
   a. 1.6% b. 2.4% c. 3.1% **d. 3.7%** e. 4.5% f. 5.3%

5. What was the average annual gain for U.S. labor productivity, 1955-2005?
   a.1% **b. 2%** c. 3% d. 4% e. 5%

6. China's economy began to boom in the 1990s, when what leader embraced the use of free markets?
   a. Chiang Kai-Shek b. Mao Zedong **c. Deng Xiaoping** d. Xi Jinping

7. What invention might devastate the finances of Saudi Arabia, Iran, and Russia?
   a. portable MRI **b. super powerful battery** c. high protein corn strain d. 4D TV

8. Which European Nation passed a budget that put it at odds with the European Commission?
   a. Spain **b. Italy** c. France d. Belgium

9. One type of positive supply shock results from a surge in?
   a. labor costs **b. labor productivity** c. oil prices d. the budget deficit

10. Who is the current Chair of the U.S. Federal Reserve?
    a. Jerome Powell b. Janet Yellen c. Steve Mnuchin d. Jon Faust e. Paul Romer

Section II (16 points)

Joey, in early 2018, intends to save $100 for two years. He investigates lending to the U.S. government versus lending to different U.S. corporations. He thinks inflation will average 2% over the next several years. Joey looks at a Bloomberg screen that provides information about the characteristics of the following U.S. Treasury securities:

U.S. T-note,	issue date 1/05/18,	repayment date 1/05/19,	price $100	yield 2.0%
U.S. T-note,	issue date 1/05/18,	repayment date 1/05/20,	price $100	yield 2.5%

A) What does Joey believe the ex-ante real yield is on the 2-year note?

Expected inflation = 2%

$\Longrightarrow$ Ex-ante real yield will be 2.5% - 2% = 0.5%

B) Suppose inflation averages 3% over the next two years. What was the ex-post real yield on the 2-year note?

Ex-post real yield = 2.5% - 3% = -0.5%

C) What do market participants, on average, expect the 1-year yield will be in 2019? (Ignore term premia considerations)

$100*(1+0.02)*(1+X)=100*(1+0.025)^2 \quad \Longrightarrow \quad X = 3\%$

OR

$(2.5\%) = \frac{2\%+X}{2} \quad \Longrightarrow \quad X = 3\%$

D) If inflation turned out to be 4% in 2018, would you expect that the government would have to offer a higher or lower interest rate to borrow money for 1-year, in 2019? And if Joey bought the 2-year note, at a price of 100, and went to sell it in 2019 would the payment he collected likely be higher or lower that 100? Briefly explain:

The government would have to offer a higher interest rate to compensate investors for higher than expected inflation.

Since interest rates will go up, bond prices will go down. Thus, he would collect less than $100 in 2019.

E) Joey now looks at a Bloomberg screen that provides information about the characteristics of a number of corporate bonds:

MSFT note,	issue date 1/05/18,	repayment date 1/05/20,	price $100	yield 3.5%
SnorX note,	issue date 1/05/18,	repayment date 1/05/20,	price $100	yield 6.5%

i) Explain why SnorX must pay a higher rate than Microsoft (MSFT) to borrow for 2 years, and why both Snorx and Microsoft pay more than the gvoernment to borrow money over the same period.

These are private (or risky) bonds whereas T-notes are risk-free. Thus, the private bonds should give higher yields than the government.

Microsoft is less risky than SnorX, therefore SnorX would offer a higher rate.

ii) Suppose that the trade war between China, Europe and the USA intensifies. Suppose further that this looks likely to badly hurt economies around the globe.

a) The price of the 2-year t-note likely (circle one answer)

Goes up Goes down

b) The price of the 2-year Microsoft note likely (circle one answer)

Goes up Goes down Goes down a lot

c) The price of the 2-year SnoreX note likely (circle one answer)

Goes up Goes down Goes down a lot

Section III (20 points)

1. The nation of Brumba has 10% unemployment, 1% inflation and it is growing at a rate that has kept these conditions in place for several years. The government authorizes a very large infrastructure program.

    a. What is likely to happen to the government's budget deficit? Explain briefly

½ point: Deficit will grow.
½ point: The Government will need to borrow additional money in order to fund the infrastructure program.

    b. What is likely to happen to real GDP growth? Explain briefly

½ point: Real growth will accelerate (or be faster, or speed up, or any word that means accelerate)
½ a point: government infrastructure spending is a part of real GDP, so it adds directly

    c. What is likely to happen to unemployment? Explain briefly

½ point: Unemployment will fall (or any word that means go down)
½ point: Faster GDP will require more employment growth, lowering U

    d. What is likely to happen to inflation? Explain briefly

½ point: Inflation will be stable or go up only slightly
½ point: starting from very high unemployment rate, you can lower unemployment and not cross NAIRU. That means inflation will not accelerate.

OR PARTIAL CREDIT FOR:

½ point: Go up.

½ point: The Phillips curve says when growth is above long-term sustainable growth, inflation will go up. (less slack in the economy)

    e. What is likely to happen to the yield on 10-year government TIPS bonds? Briefly explain

½ POINT: Go up.
½ POINT: TIPS are inflation indexed bonds OR The yield on a TIPS bond is a REAL yield. As government borrowing has gone up, the loanable funds models suggest real interest rates will rise. Hence the TIPS bond yield will rise.

f. What is likely to happen to the yield on the 10-year government bond? Use your responses to d, e, and the Fisher equation to briefly explain your answer.

1 point: Go up (or any word that means up).
½ point: Fisher equation says the nominal interest rate is $i = r + \pi$
½ point: From d we know inflation is stable up (or up). From e we know r will go up. So i will also go up!

2. Briefly explain the Malthusian dilemma, and explain why developed world economies have avoided the dire outcome defined by the dilemma.

½ point: the supply of land for farming is constrained & as population grows, population growth will BE CONTROLLED BY starvation.
½ point: technology lets us grow despite finite resources

3. Some suggest Schumpeter's notion of creative destruction can be labeled the price of progress.
   a. Briefly explain the notion that creative destruction is the price of progress

1 point: New technology often results in loss of jobs in the old technology (e.g. stable workers following the invention of the car). This can result in higher unemployment in the short run. It is called the 'price of progress' because in order to get the new technology, the old jobs will have to be lost.

   b. When Lehman Brothers went bankrupt, in 2008, some enthusiasts of Schumpeter's theories objected to any government intervention efforts to limit economic decline. Keynes would have disagreed. Briefly explain.

½ point: Keynes would have seen the main problem as a lack of aggregate demand, not new technology replacing old technology.
½ point: If new technology was replacing old technology, we would expect GDP to rise even if jobs were being lost (the new technology produces more GDP/worker)

OR

½ POINT: KEYNES would have seen the problem as a collapsing banking system (or collapsing confidence, or collapsing animal spirits)
½ point: banks going bankrupt is not the same as creative destruction

4. Real GDP growth averaged around 3.3%, 1955 to 2005. Today, forecasters fear it may only grow at 2% per year. What were the numerical values for the piece parts of 3.3% historical growth, and why do forecasters look for only 2% growth going forward?

LTSG = Labor productivity growth + labor force growth,
½ point: Labor grew at 1.3% (accept any number from 1% to 1.5%)
½ point: Labor productivity grew at 2% (accept any number from 1.8% to 2.3%)

½ a point: Forecasters expect productivity to be about 1.5% (accept any number from 1.3% to 1.7%)
½ a point: Forecasters expect labor growth to be about 0.5% (accept any number from 0.3% to 0.7%)

5. Paul Romer is optimistic about a rebound for economic growth. Romer believes that the key to strong growth is what?

   1 points: New ideas and technology

6. Romer argues that *non-rivalry* is a concept that must be understood when thinking about the key driver for long term real growth. Briefly explain

   ½ point: A non-rival good is one that, when used by one person, does not stop anyone else from using it.
   ½ point: An idea is non-rival. If I have the idea of how to make electricity, that idea can be used by anyone in the world to make electricity. This contrasts with a rival good such as a car. If I am driving a car, no one else can drive the same car.

7. Romer's focus on non-rivalry issues leads him to argue for what government polices to support strong growth in the future?

   ½ point: Investment in research and development and new technologies.
   ½ point: patent laws

8. Over the 1995 to 2005 period, alongside the average 3.3% real GDP growth, the average real borrowing rate for the U.S. treasury equaled roughly
   a. 1.0% **b. 2.6%** ½ point c. 3.3% d. 4.0% e. 5.3%

9. The average annual growth rate for real GDP, 2010 through 2017, was 2.1%. Late in 2017, a large fiscal stimulus was enacted. Over the four quarters ending in Q3:2018, real GDP growth averaged roughly
   a. 1.5% b. 2.0% c. 2.5% **d. 3.0%** ½ point

10. Annual growth for labor productivity averaged 1.3% over the 2010-2017 period. As noted above, in late 2017, a large stimulus was enacted. Productivity growth over the past four quarters—Q3:17 through Q3:18—has averaged,
    a. 0.7% **b. 1.3%** ½ point c. 2.1% d. 2.6%

11. Those who champion markets free of government intervention correctly point out that, much of the time, *the invisible hand* directs business decision makers to produce in accordance with the wants of the populace. What is the essential signal that comes from free markets, and delivers this positive set of outcomes?

½ points: Price signals (any comments that suggest changing prices deliver signals)

12. Markets don't always succeed in delivering the best outcomes.
    a. Very briefly define a pure public good.

A pure public good is 2 things:
½ point: Non-rival, AND/OR One person's use does not stop someone else using it
½ point: Non-excludable, AND/OR If it exists it is impossible to stop people from using it

    b. How does the free rider problem issue arise, when societies consider how to provide pure public goods?

½ POINT: A public good is non-excludable,
½ point: If someone refuses to pay for it they can still use it. This is the free rider problem

    c. What about *externalities?* Explain how climate change, if it is real, is a classic market externality.

½ point: An externality is a cost or benefit that does not go to the parties involved in the transaction.
OR 1 point: ANYTHING THAT SOUNDS LIKE: an externality is when a company produces something and part of their process causes pollution, which they don't have to pay for.

½ POINT: Climate change is a classic externality. If I buy gas from Exxon, I benefit from powering my car and Exxon benefits because I paid them. However, powering my car adds to climate change which is a cost that everyone in the world has to pay.

Section IV (32 points)

In 2024, the U.S. economy is struggling. Unemployment has risen dramatically. Trouble began in January 2023, with a spike in oil prices, generated by terrorist bombing of important production fields in Saudi Arabia. In January 2024, a second blow hits the economy, when households become much more risk averse, as they panic about corporations' high debt levels. The table below provides an incomplete list of macro data.

	Q4:2022	Q4:2023	Q4:2024
crude oil price ($/bbl.)	$60		
Unemployment	4.0%	5.0%	6.0%
CPI	2.0%	5.0%	0.0%
CPI: index level	100		
CPI, excluding energy	2.0%		
Real U.S. Output: Index level	100.00		
Federal Government Spending	$2.0 trillion	$2.2 trillion	$2.5 trillion
Federal Taxes Collected	$1.7 trillion	$1.3 trillion	$1.5 trillion
Corporate/government spread	2.0%	2.0%	4.5%
10-year Government bond yield			2.5%
10-year yield minus TIPS yield	2.0%	2.5%	2.0%

Key Equilibrium Values:
LTSG = 2.5%
U* = 4%
π* = 2%
oil = 10% of the CPI
Phillips Curve α = 0.5
Okun coeffficient = 1.5

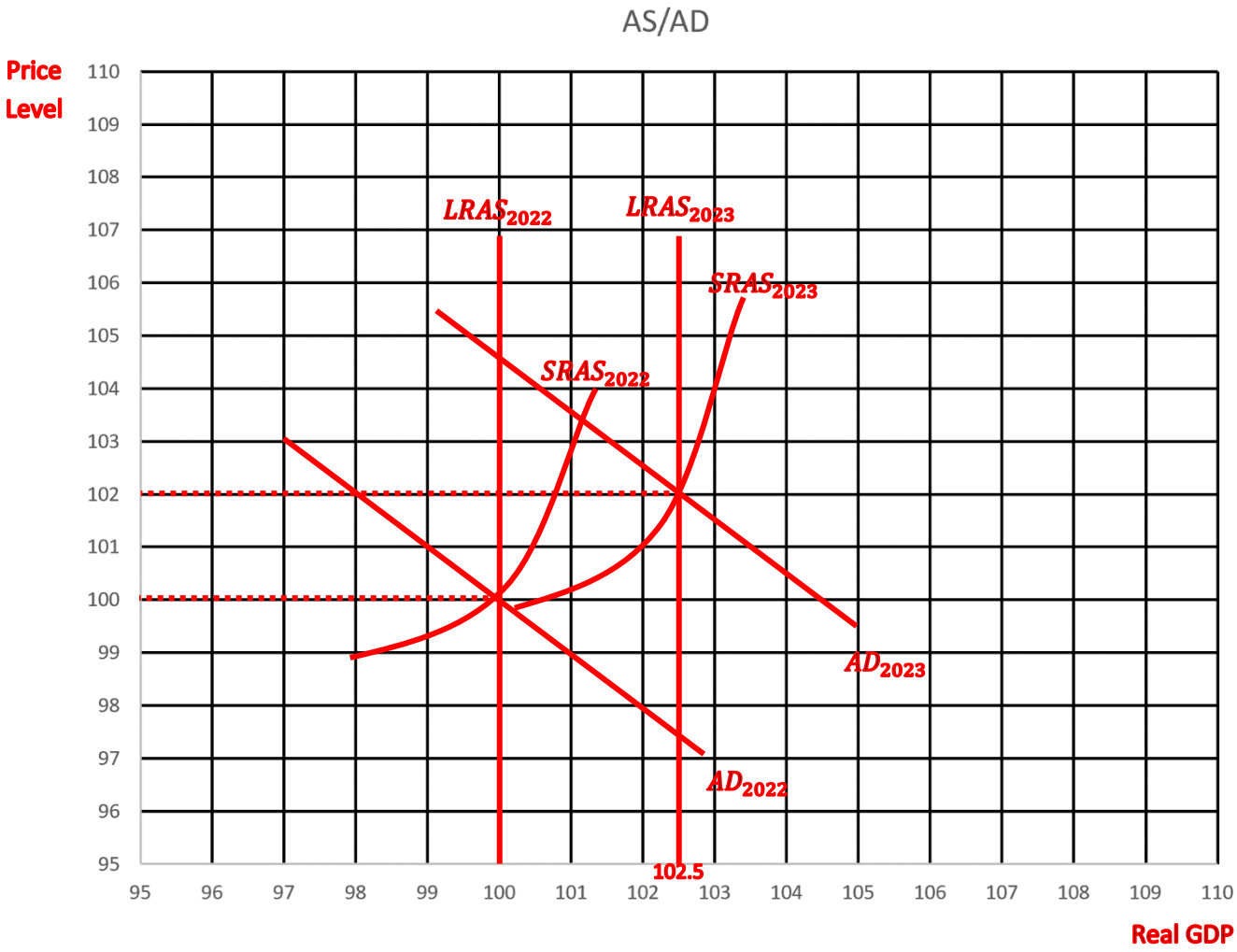
Note: Inflation expectations, provided above, are derived from the treasury 10-year TIPS spread
The government borrows virtually all of its funds by issuing 10-year treasury notes.

1. Assume a standard Phillips curve successfully predicts the CPI:ex energy. Based upon the information given in the tables above, compute the CPI:ex energy, for Q4:2023 and Q4:2024
   π_e are explicitly given, via the 10-year tips spread: 2.5% for 2023 and 2% for 2024.
   Phillips curve: $\pi_t = \pi^e + \alpha(U^* - U_t)$
   $\pi_{Q4:2023} = 2.5 + 0.5(4 - 5) = 2\%$
   $\pi_{Q4:2024} = 2 + 0.5(4 - 6) = 1\%$

2. Use your answers to question "1" and the information in the table to compute the oil price levels for Q4:2023 and Q4:2024.

   CPI headline = 0.9*CPIXenergy + 0.1*OIL PRICE INFLATION
   ⇨ Oil Price Inflation = 10*(CPI headline – 0.9*CPIXenergy)
   Oil Price Inflation Q4:2023 = 10*(5 – 0.9*2) = 10*(5 – 1.8) = 32%
   ⇨ Oil Price Q4:2023 = 60 * (1+0.32) = 79

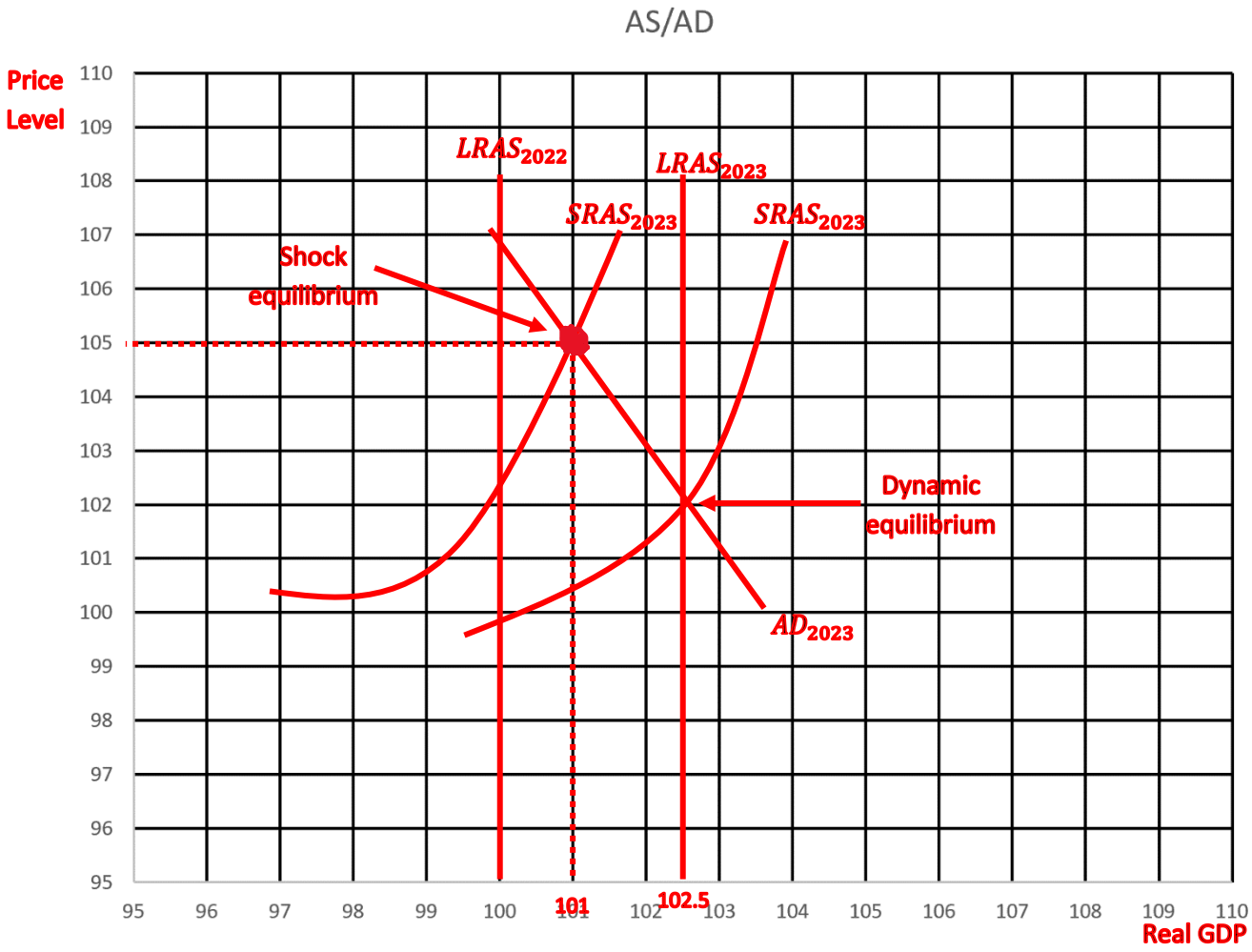
   Oil Price Inflation Q4:2024 = 10*(0 – 0.9*1) = 10*(-0.9) = -9%
   ⇨ Oil Price Q4:2023 = 79 * (1-0.09) = 72



3. In the space provided above label the axes, draw all three AD and AS curves, and identify equilibrium for Q4:2022.

4. Suppose we did not have an oil shock in 2023. Instead, suppose the economy growth at its long term sustainable pace. Using the same space at the top of this page, provide the 2023 AD and AS curves that allow you to depict dynamic equilibrium from Q4:2022 through Q4:2023.

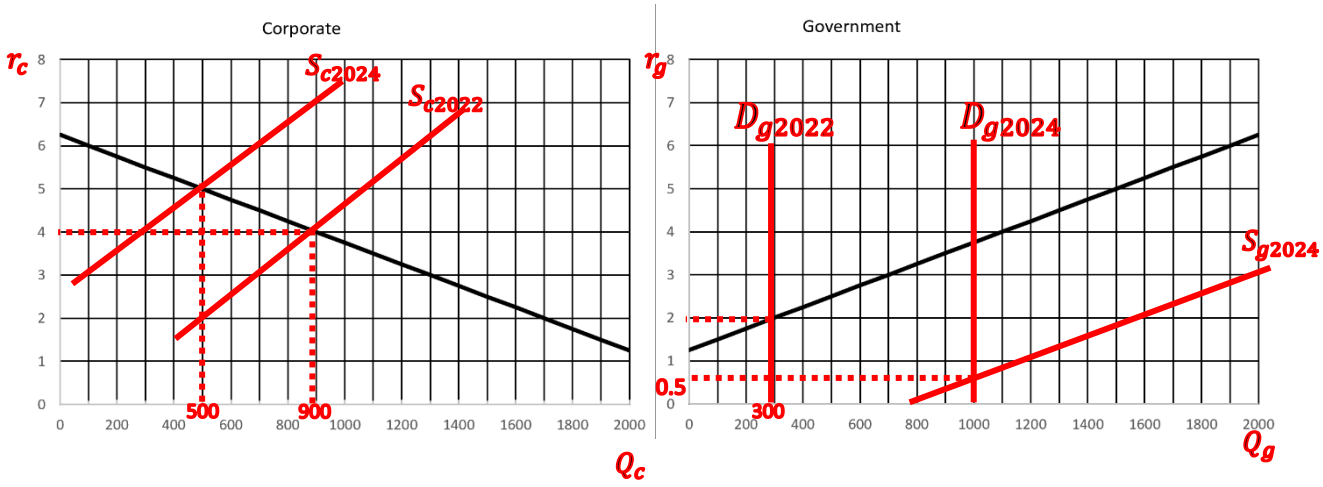
Inflation : 2% (no oil price shock) $\Rightarrow$ CPI_{2023} = 100 * (1.02) = 102
Real GDP growth = LTSG = 2.5% (no oil price shock) $\Rightarrow$ Y_{2023} = 100 * (1.025) = 102.5
All three shift in parallel to a new equilibrium at CPI = 102, Y = 102.5



5. We now use the quadrant above to depict AD/AS analysis for the 2023 oil shock.
   a. Draw the 2023 LRAS Curve and the 2023 SRAS curve assuming dynamic equilibrium
      See graph.
   b. Use Okun's law to calculate the value for 2023 output
      Okun's law: %change Y = LTSG - 1.5*(change in U) = 2.5 - 1.5*(5-4) = 1%
      Equilibrium Y = 100 * 1.01 = 101
   c. Use the data in the tables to calculate the value for the 2023 price level
      headline Inflation = 5% (from table, includes oil price)
      $\Rightarrow$ CPI_{2023} = 100 * (1.05) = 105
   d. Depict the output/price value for 2023 on the quadrant above (draw the "dot")

      SRAS and AD cross at Y=101, P= 105

   e. Now draw the AD and SRAS curves that capture the oil price shock.
      See graph.



6. We now will consider the full set of events that unfolded, from 2022 through 2024, using our loanable funds diagrams. In the two quadrants above, label the axes and the line in each graph.
   See graph.

7. Now, using the information presented in the table at the top of this question, add the additional lines needed to complete the picture for 2022. (Hint: Make sure the lines you add produce the correct equilibrium levels in both quadrants.)

   Government demand:
   Federal Government Spending – Federal Taxes collected = $2 trillion - $1.7 trillion = $300 billion
   $\Rightarrow$ r_g = 2%
   Corp = 2% + 2% = 4%. (government real borrowing rate + corporate/government spread)
   Upward sloping household supply curve cross corporate loan demand at 4%.

8. Now we consider 2024. Consider the description of the second blow that hits the U.S. economy. What curves would you expect to shift, and in which direction?

   Households become much more risk averse $\Rightarrow$ households saving goes to SAFE 10-year Government bond

   households decrease their willingness to fund corporations

   Supply to corporates shifts left

   Supply to government shifts right

9. For 2024, using the graph and the information in the table above, determine the equilibrium alevels in the government quadrant. (Briefly explain)

   10yr nominal rate = 2.5%
   10y inflation expectations are 2%, given by breakevens
   $\Rightarrow$ r_g = 0.5% in 2024.
   Government demand at $1 trillion (Government Spending – Taxes collected = $2.5trillion - $1.5trillion)
   New equilibrium: Q_g = $1 trillion and r_g = 0.5%.

10. Draw the curve(s) that intersect at this new equilibrium.

    See graph.

11. Again, for 2024, using your results from question 8 and the information in the table above, calculate the equilibrium values in the corporate borrowing and lending space. (briefly explain)

    10yr nominal rate = 2.5% and corporate/government spread 4.5%
    $\Rightarrow$ corporate 10-year nominal borrowing rate = 2.5+ 4.5 = 7%
    $\Rightarrow$ real rate = 7% - 2% = 5%
    (2% = 10-year inflation expectation, derived using treasury 10-year TIPS spread)
    If corporate demand curve does not move, equilibrium is Q_c = $500 billion.

12. Draw the curve(s) that intersect at this new equilibrium.

    See graph.

13. One economist, contemplating 2024, remarked, “The flow of funds data make it clear that there was a rise for the savings rate, and I think that played a material role in the plunge for the economy”. What phrase did John Maynard Keynes use, to describe the notion that rising savings can drive the economy lower?

    The paradox of thrift

14. Assume that 100% of household savings was used to buy either corporate or government bonds. Based upon the data in the table provided and the values on your charts, calculate total savings in 2024 and 2022. Did households save more in 2024 than in 2022?

    BY READING OFF GRAPHS

    2022: total lending = 300 (govt) + 900 (corporate) = $1.2 trillion

    2024: total lending = 1000 (govt) + 500 (corporate) = $ 1.5 trillion

⇨ Lending increased in aggregate
⇨ Lending = household saving
⇨ Household saving increased

15. Some economists argue that if households did save more and spend less, the loanable funds model suggests the economy would not suffer. Explain their line of reasoning.

    When supply of savings increases, interest rates go down and corporate investment goes up, so the economy does not shrink.

16. How does our expanded loanable funds model allow us to reject the ideas described in question 15. Put differently, why did higher savings fail to help the economy in 2024?

    Higher savings were reserved for safe government bonds and did not reduce the interest rate available to corporates. Household savings to corporations violently decreased. The corporate borrowing rate soared, and investment plunged.