SUNY-Binghamton **Name** _____
Fall 2026 Economics 450
Monetary Economics Final exam

No calculators. Total points on exam: 245. Good luck! Look over the entire exam before you begin. If I ask you to explain your answer, your grade for the question will depend on your *explanation*.

1) 5 pts. You buy a 30-year coupon bond today for $10. After one year, you sell it for $11. In the meantime, you receive a coupon payment of $1. What rate of return did you receive?

_____ percent

2) 5 pts. A zero-coupon bond will pay $90 in May 2028, exactly two years from now. The current price of the bond is $10. What is the yield to maturity on this bond?

_____ percent

3) Suppose that current market yields to maturity for "zero-coupon" bonds are:

${}_1i$ percent for bonds paying off May 2027 (one-year zero coupon bonds)

${}_2i$ percent for bonds paying off May 2028 (two-year zero-coupon bonds)

${}_3i$ percent for bonds paying off May 2029 (three-year zero-coupon bonds)

You are offered a bond that will make a payment of $50 in May 2027, $60 in May 2028, and $70 in May 2029.

a) 5 pts. Write a formula that defines the highest price anyone should be willing to pay for the bond.

b) 5 pts. Suppose that today's market price of the bond is $130. Write a formula that defines the "yield to maturity" on the bond. Circle the symbol that stands for yield to maturity, everywhere it appears.

4) 10 pts. Suppose people care only about the expected value of the return on an investment. The yield on a one-year zero-coupon Treasury bond is 50% (0.50 or 1/2). XYZ corporation has issued a bond which promises to pay $300 in one year (IOU is $300). XYZ might default on the bonds (not pay at all). Everyone believes the probability that XYZ will default is 1/2. What is today's market price of the XYZ bond? $_____

5) 15 pts. Fundamentally, why are loans illiquid assets? That is, I said loans are relatively illiquid in the sense that there may be legal costs (have to pay lawyers) to transfer ownership of a loan to a buyer, which don't exist when a bond is sold. And, apart from those legal costs, it can be hard for a lender to find a buyer for a loan. But why are those things true? Why do those legal costs exist? Why can it be harder to find a buyer for a loan than for a bond?

6) 10 pts. What are "Bagehot's rules"?

7) 10 pts. In the context of monetary policy, what are “anchored expectations”?

8) Consider an economy with no banks and no central bank. A person faces a situation similar to that described by the standard Baumol-Tobin model. As in that model,

Y is annual income, received at the beginning of the year

i is the annual interest rate or bond yield (expressed as a fraction, as in class)

N is the number of financial transactions the person engages in.

$\frac{M}{P} = \frac{Y}{2N}$ is the average money balance if the person engages in N financial transactions.

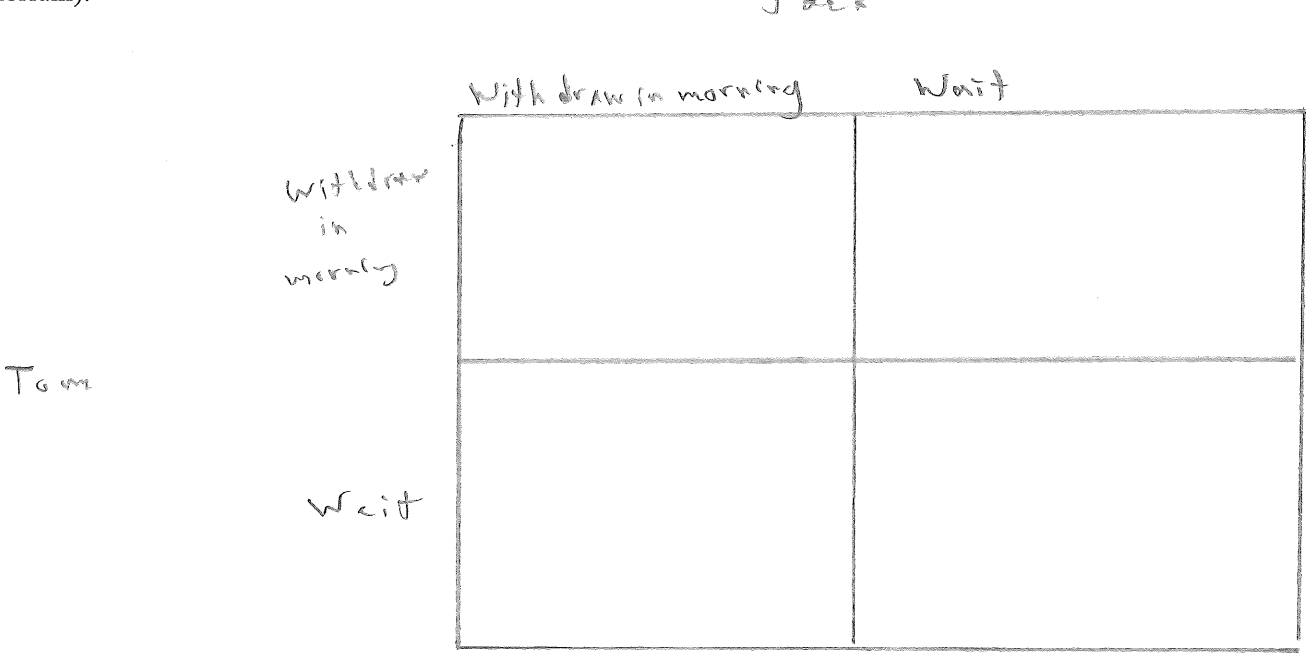
Here, however, the cost of engaging in one financial transaction is not F. Here the cost of engaging in a financial transaction is *lower* for a person with a higher income, because the staff in the bond brokerage are nicer to rich people. The cost of engaging in one financial transaction is f/Y. The total cost of engaging in N financial transactions is $(f/Y)N$.

a) 10 pts. Derive the average real money balance that a person will choose to hold.

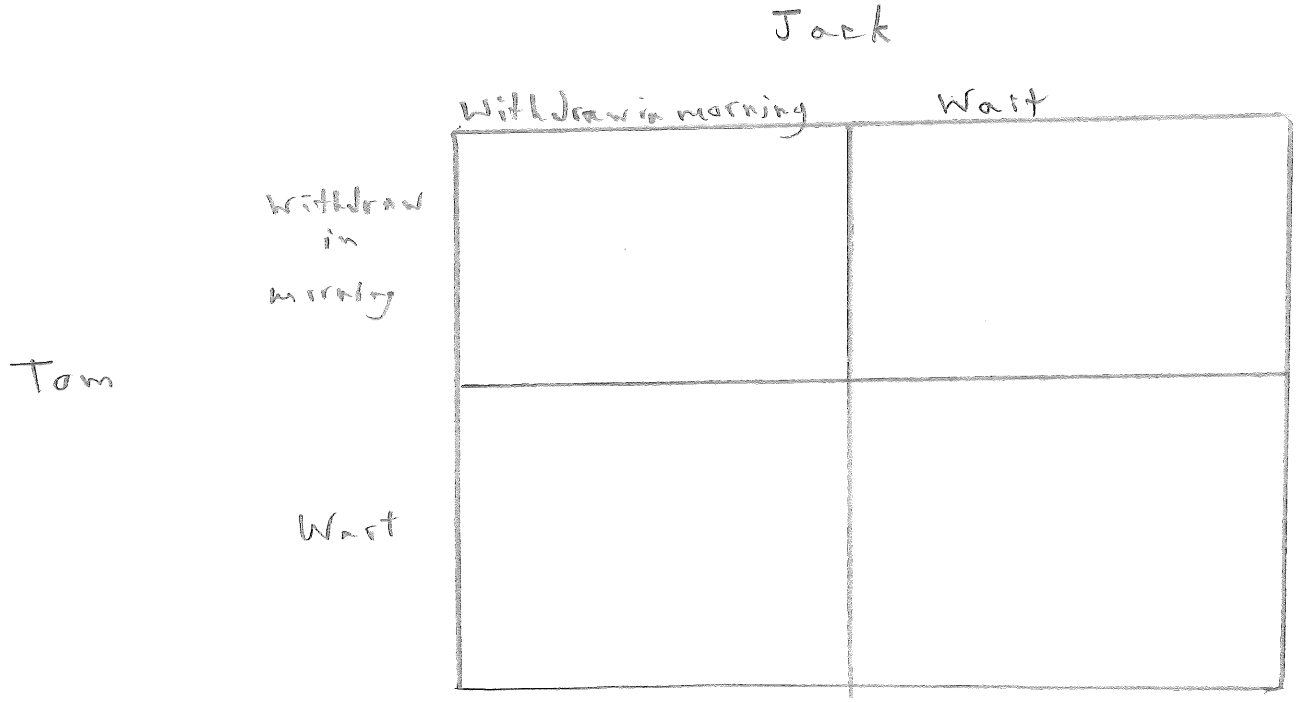
b) 10 pts. Suppose the supply of money and the price level are fixed. What happens to the interest rate in this economy if there is an increase in income Y? Explain, using your answer to a). Use a graph if you want.

9) Billy is broke, but he has a plan. Tonight he will borrow $100 from each of his two room-mates, Jack and Tom, then drive to the Krispy-Kreme place in Scranton and spend the $200 on doughnuts. Tomorrow afternoon, he will sell the doughnuts in front of LH 4 just before Econ 160 which has many doughnut lovers willing to pay a pretty penny for Krispy Kremes. Tomorrow evening, Billy says, he will pay Jack and Tom each $150 (keeping a nice profit for himself). Jack and Tom hesitate to lend. Each fears that he may need cash tomorrow morning, *before* Econ 160. To persuade them to lend, Billy promises to pay back $100 to anyone who asks for his money back tomorrow morning. In fact, however, if either Jack or Tom or both asks for money back tomorrow morning, Billy will have to sell the doughnuts *immediately* around the dorm, which is full of people who don't like doughnuts very much; in that case Billy will get just $100 for the doughnuts - not enough to pay $100 to both Jack and Tom.

a) 10 pts. Suppose Jack and Tom believe that, if one of them asks for his money back in the morning and the other waits until evening, the one who asks for his money back in the morning will get $100, the other will get nothing; if both ask for their money back in the morning, both will get $50. Fill in boxes to describe this. Circle the outcome(s) that can actually occur (equilibrium).

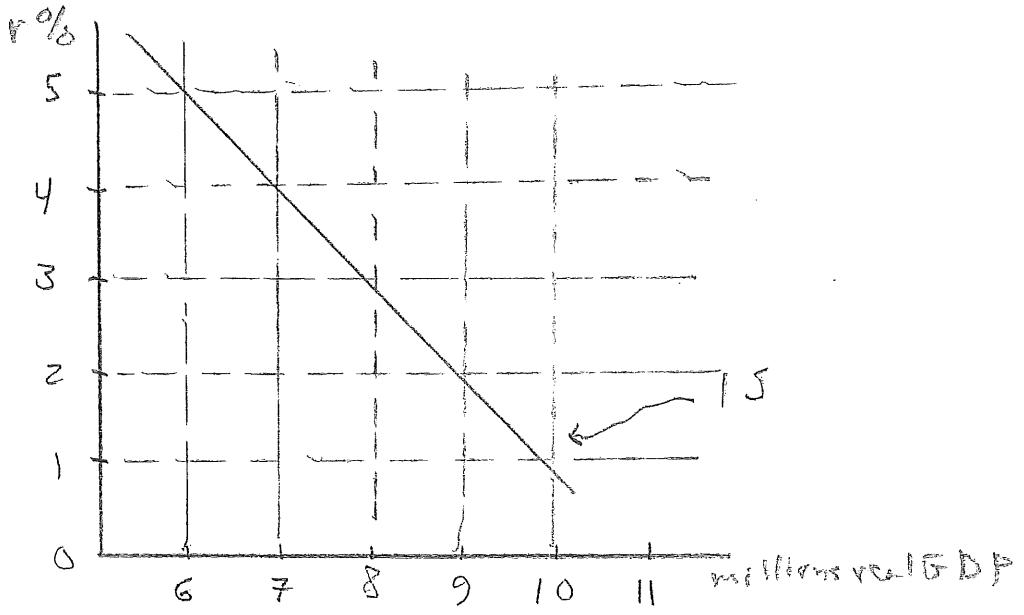


b) 10 pts. Now suppose Jack and Tom have different beliefs. As before, Billy promises to pay Jack and Tom each $150 tomorrow evening. But everyone knows Jack is Billy's best friend. If both Jack and Tom ask for their money back in the morning, Jack will get $100; Tom will get nothing. If Tom asks for his money back in the morning and Jack waits until evening, both Tom and Jack will get $50. If Jack asks for his money back in the morning and Tom waits until evening, Jack will get $90; Tom will get $10. Fill in boxes to describe this. Circle the outcome(s) that can actually occur (which can be an equilibrium).



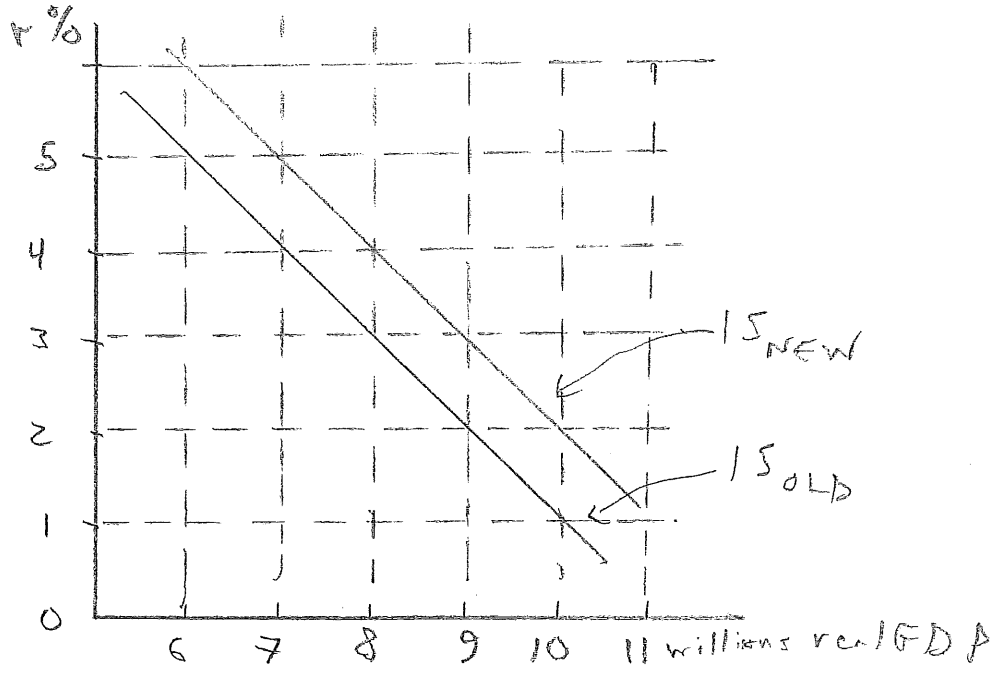
10) Suppose the Fed is following an "inflation targeting" strategy. The Fed's target inflation rate π^T is 2 percent. The natural rate of unemployment (or NAIRU) is 5 percent. When the unemployment rate is 5 percent, real GDP is equal to 8 million units of output. Expected future inflation is 2 percent. For simplicity, assume that there is just one nominal interest rate, denoted *i*, and the Fed can control it.

a) 5 pts. Suppose the IS curve in the economy is the one plotted to the right, and the Fed's economists correctly estimate the position of the IS curve.



What value will the FOMC set for the nominal interest rate *i*? _____ percent
Will the unemployment rate probably turn out to be greater than, less than or equal to 5 percent? _____
Will inflation probably turn out to be greater than, less than or equal to 2 percent? _____

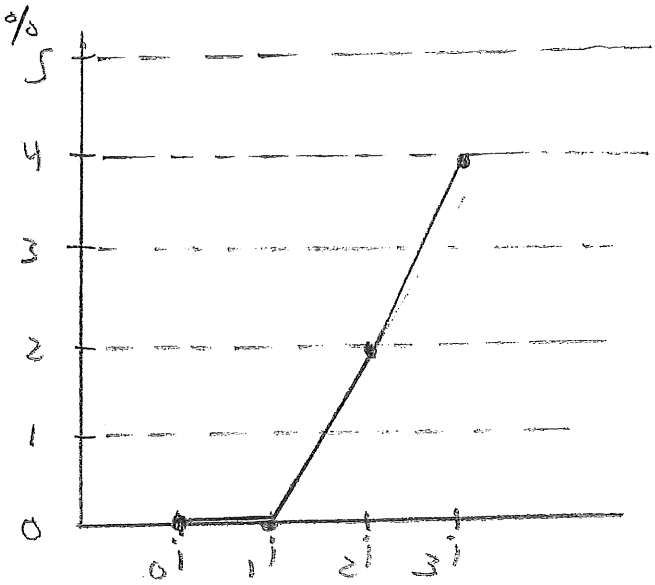
b) 5 pts. Suppose that the IS curve in the economy changes, as plotted to the right, and the Fed's economists *correctly* estimate the shift in the IS curve.



Now what value will the FOMC set for the nominal interest rate *i*? _____ percent
Will the unemployment rate probably turn out to be greater than, less than or equal to 5 percent? _____
Will inflation probably turn out to be greater than, less than or equal to 2 percent? _____

c) 5 pts. Suppose that the IS curve changes as in b), but the Fed's economists *do not know* this is happening. They *continue* to believe that the IS curve is as in a).
Now what value will the FOMC set for the nominal interest rate *i*? _____ percent
Will the unemployment rate probably turn out to be greater than, less than or equal to 5 percent? _____
Will inflation probably turn out to be greater than, less than or equal to 2 percent? _____

11) 15 pts. Suppose that the conditions assumed for the "expectations hypothesis" are true: all that people care about is the expected value of the return to an investment. Also suppose the Fed has given "forward guidance" with respect to its future settings of the fed funds target rate.
Right now, the target is zero.
The Fed has promised that it will hold the target at zero for a year, then raise the target to two percent and hold it there for a year; then raise the target to four percent and hold it there for a year. After the Fed gave this forward guidance, the yield curve looked like this:



Did the forward guidance work, that is, does the public believe the Fed will do exactly what it promised? Explain exactly how you know.

12) 10 pts. In the years following the financial crisis of 2008, when the Fed had cut the target fed funds rate to "practically zero," it followed "unconventional monetary policies" to boost real GDP. One of those "unconventional" policies was "quantitative easing (QE). Explain what QE was, and how Fed policymakers thought it could perhaps help boost real GDP.

13) 10 pts. Explain why some economists believe the Fed should replace its current inflation target of two percent with an *average* inflation target of two percent, that is a commitment to keep inflation equal to two percent on average over a five-year window.

14) This question is about r^* ("r-star).

a) 5 pts. What is r^*? I don't mean what is the number. I mean, what do Fed economists mean when they say "r^*"?

b) 10 pts Some Fed economists believe that r^* has increased in recent years, and that this is a good thing, because it makes it easier to use monetary policy to control real activity and inflation. Why would an increase in r^* make monetary policy easier to do?

15) Suppose there is no reserve requirement and the Fed does not pay interest on reserves ($r_D = 0$). The Fed charges an interest rate $r_P = 4$ for emergency loans to cover overdrafts. The market overnight rate is *r*. All banks in the country are identical. Each bank has *$100* to divide between its reserve account and overnight lending. At 6 pm each bank will choose how much to leave in its reserve account. Between 6 and 7 pm. the Fed will clear payments between banks, adding a net sum *P* to each bank's reserve account. *P* can be a positive or negative number. That leaves *R+P* in the bank's reserve account at 7 pm. A bank will have overdrawn its reserve account if the balance after clearing, at 7 pm, falls below zero. A bank that overdraws its reserve account must take an emergency loan from the Fed to cover the overdraft. From a bank's point of view, *P* is a random variable, uniformly distributed between a minimum value (the smallest possible net payment into the bank's reserve account) of *-4*, and a maximum value (the largest possible payment into the bank's reserve account) of *+4*.

a) 5 pts. Suppose a bank wants to make absolutely sure it cannot possibly run an overdraft in its reserve account. How big does *R* need to be?

b) 5 pts Write an expression that gives the probability that a bank will run an overdraft in its reserve account for given *R*, (assuming $r_D < r < r_P$).

c) 5 pts Write an expression that gives the probability that a bank will *not* run an overdraft in its reserve account (assuming $r_D < r < r_P$).

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d) 5 pts Assuming a bank runs an overdraft in its reserve account, what is the expected value of the amount that the bank will have to borrow from the Fed (assuming $r_D < r < r_P$)?

e) 5 pts Assuming a bank does *not* run an overdraft in its reserve account, what is the expected value of the amount that the bank will have in its reserve account (assuming $r_D < r < r_P$) ?

f) 5 pts. Write an expression that gives the expected value of a bank's profit.

g) 5 pts. Using your answer to f) and calculus and algebra, find the reserve balance R^D that a bank would choose to leave in its reserve account at 6 pm.

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h) 5 pts Suppose reserve supply per bank is 3. What will the market overnight rate r be?

i) 5 pts Suppose reserve supply per bank is 10. What will the market rate r be?