Problem 1. Consider the balance sheet below that belongs to Bank A. The required reserve ratio is 10 percent. Bank A makes a loan of $15,000 to Ashley by opening a savings account for her and depositing that money in a savings account. Ashley gives that money to Brian, who deposits it in Bank B. Update the balance sheet after the loan is made but *before* the money is transferred to Bank B.

Assets		Liabilities and Net Worth	
Reserves	$20,000	Demand Deposits	$150,000
		Other Deposits	$650,000
Treasury Bonds	$30,000	Discount Loans	$20,000
		Interbank Loans	$80,000
Loans	$950,000	Net worth	$100,000

Answer 1. Bank A increases Loans by $15,000 on the Assets side, and since the money is placed in Ashley's savings account, we see Other Deposits increase by $15,000 on the Liabilities side. That's it.

Reserves	$20,000	Demand Deposits	$150,000
		Other Deposits	**$665,000**
Treasury Bonds	$30,000	Discount Loans	$20,000
		Interbank Loans	$80,000
Loans	**$965,000**	Net worth	$100,000

Problem 2. Consider the balance sheet below that belongs to Bank A. The required reserve ratio is 10 percent. Bank A makes a loan of $15,000 to Ashley by opening a savings account for her and depositing that money in a savings account. Ashley gives that money to Brian, who deposits it in Bank B. Update the balance sheet after the loan is made, *after* the money is transferred to Bank B, but *before* the Fed extends the needed loan to Bank A.

Assets		Liabilities and Net Worth	
Reserves	$20,000	Demand Deposits	$150,000
		Other Deposits	$650,000
Treasury Bonds	$30,000	Discount Loans	$20,000
		Interbank Loans	$80,000
Loans	$950,000	Net worth	$100,000

Answer 2. Start with the answer to the previous question. Because Ashley now transfers her borrowed funds of $15,000 to someone at a different bank, Bank A sees Other Deposits fall by $15,000 on the Liabilities side – her savings account at Bank A is now empty.

Bank A actually pays for that transfer by giving $15,000 of its reserves to Bank B. Therefore Reserves drop by $15,000 on the Assets side. This is problematic for Bank A because they are required to hold $\$150,000 \times 10\% = \$15,000$ as required reserves, which they currently fall short of.

Reserves	**$5,000**	Demand Deposits	$150,000
		Other Deposits	$650,000
Treasury Bonds	$30,000	Discount Loans	$20,000
		Interbank Loans	$80,000
Loans	**$965,000**	Net worth	$100,000

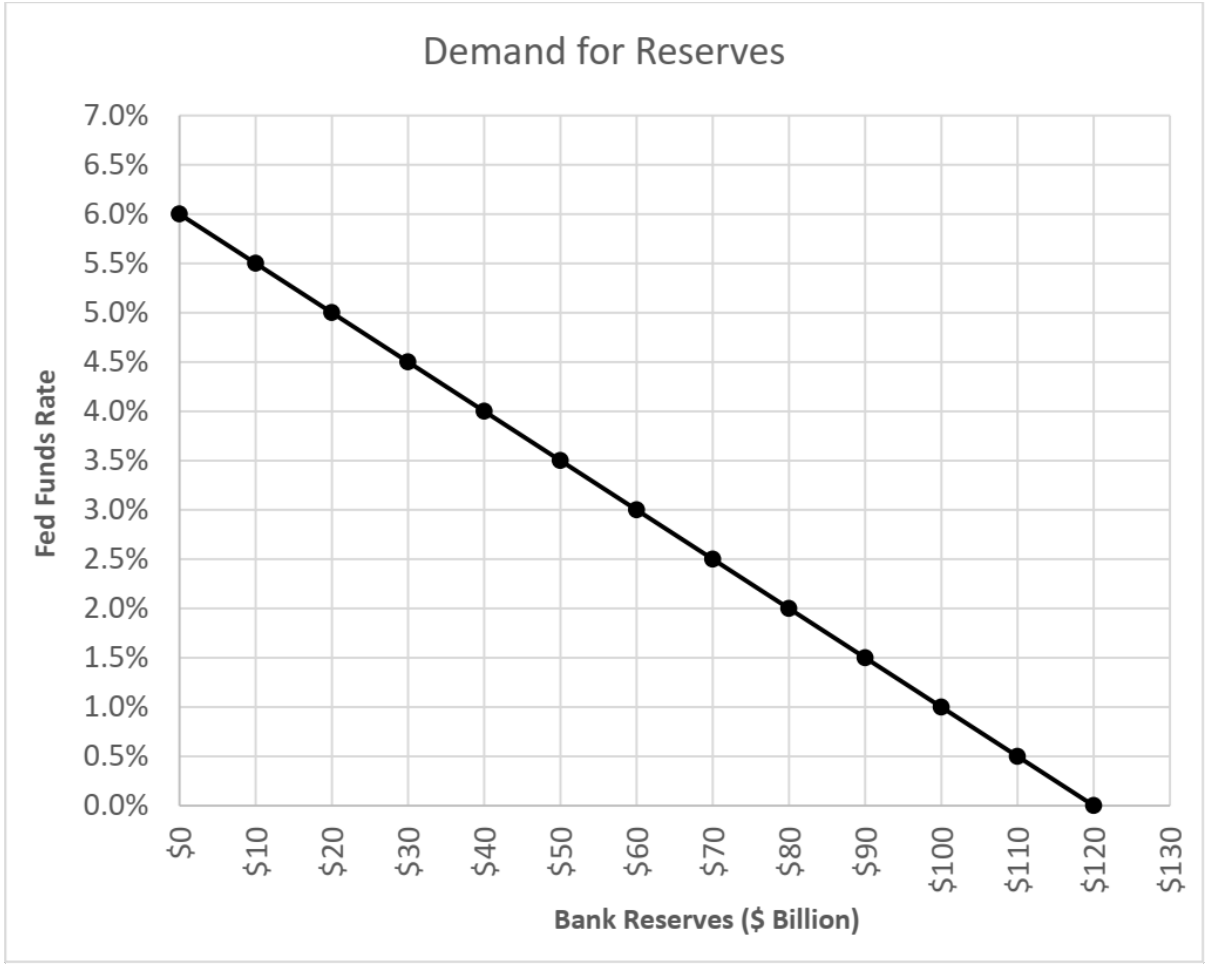
Problem 3. Consider the balance sheet below that belongs to Bank A. The required reserve ratio is 10 percent. Bank A makes a loan of $15,000 to Ashley by opening a savings account for her and depositing that money in a savings account. Ashley gives that money to Brian, who deposits it in Bank B. Update the balance sheet after the loan is made, *after* the money is transferred to Bank B, and *after* the Fed extends the needed loan to Bank A.

Assets		Liabilities and Net Worth	
Reserves	$20,000	Demand Deposits	$150,000
		Other Deposits	$650,000
Treasury Bonds	$30,000	Discount Loans	$20,000
		Interbank Loans	$80,000
Loans	$950,000	Net worth	$100,000

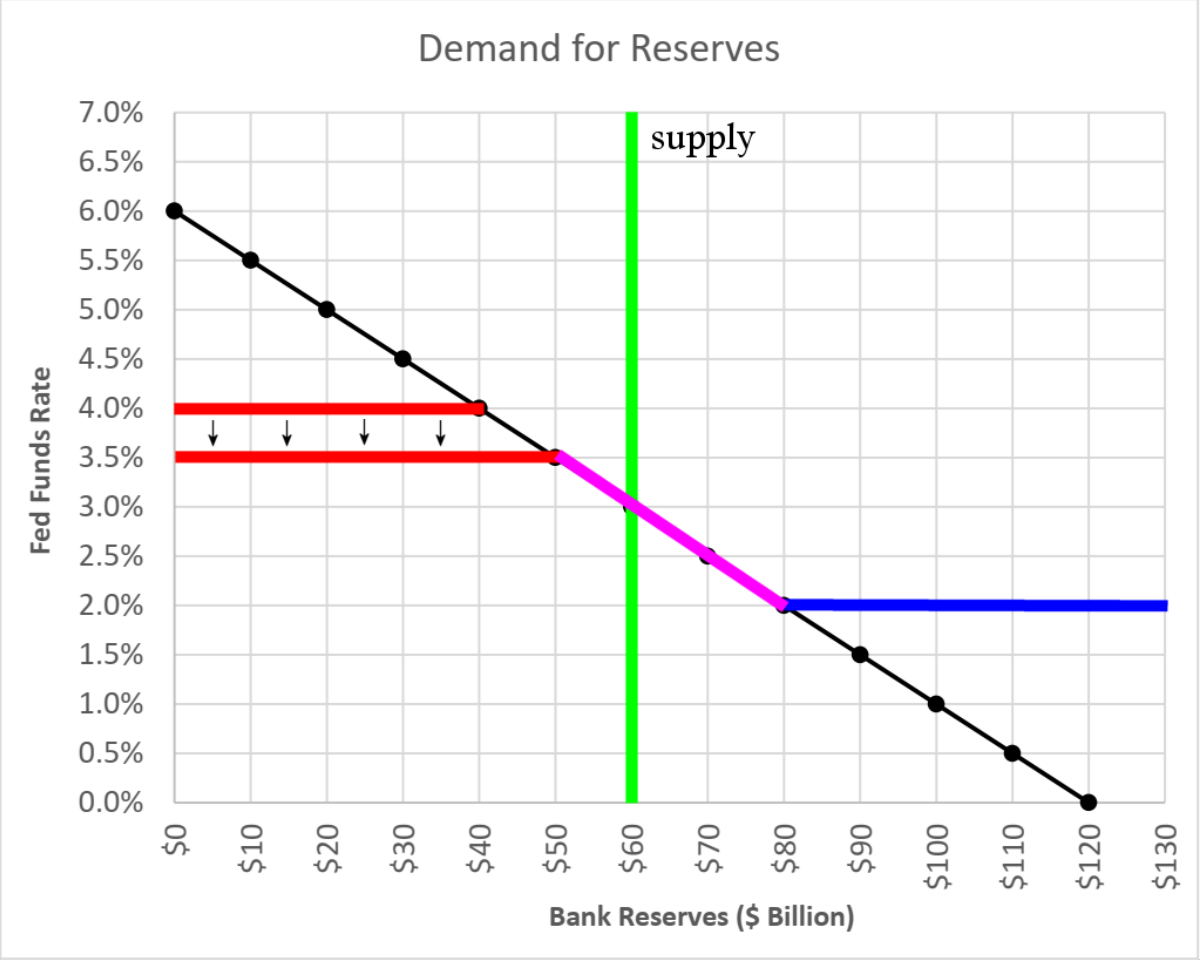
Answer 3. Start from the previous answer. As foreshadowed in the previous question, Bank A only has $5,000 reserves after the transfer but is required to hold $15,000. Therefore Bank A will borrow $10,000 from the Fed to bring its holdings of reserves up to the required $15,000. That means we'll see Reserves go up by $10,000 on the Assets side and Discount Loans go up by $10,000 on the Liabililties side.

Reserves	**$15,000**	Demand Deposits	$150,000
		Other Deposits	$650,000
Treasury Bonds	$30,000	Discount Loans	**$30,000**
		Interbank Loans	$80,000
Loans	**$965,000**	Net worth	$100,000

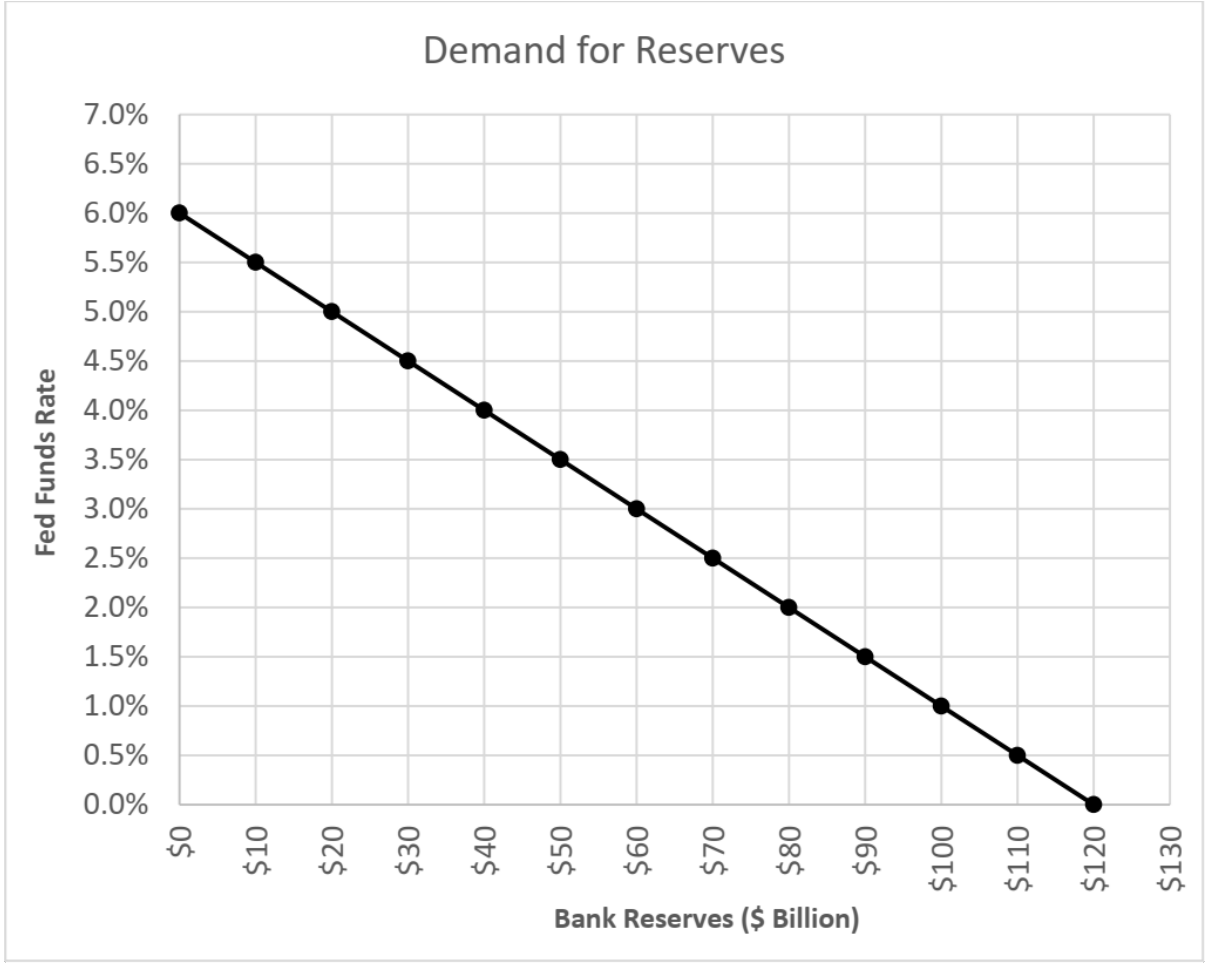
Problem 4. Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is \$60 billion. If the Fed reduces the discount rate to 3.50 percent, what will the equilibrium fed funds rate be?



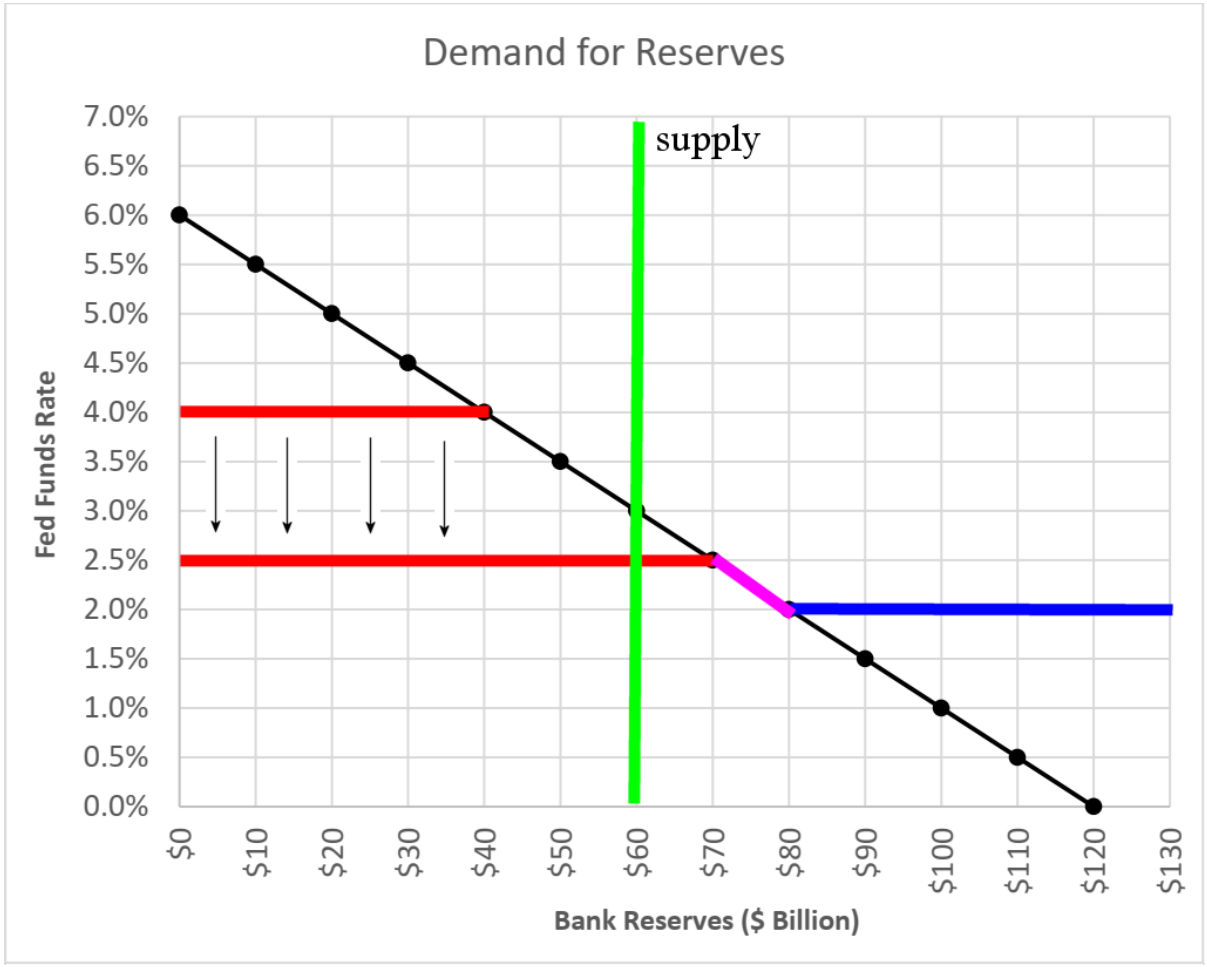
Answer 4. Draw the reserve supply vertically at \$60. The initial intersection is at 3%. When the discount rate (the red segment) is reduced from 4.0% to 3.5%, the intersection is unaffected and therefore remains at 3.0%.



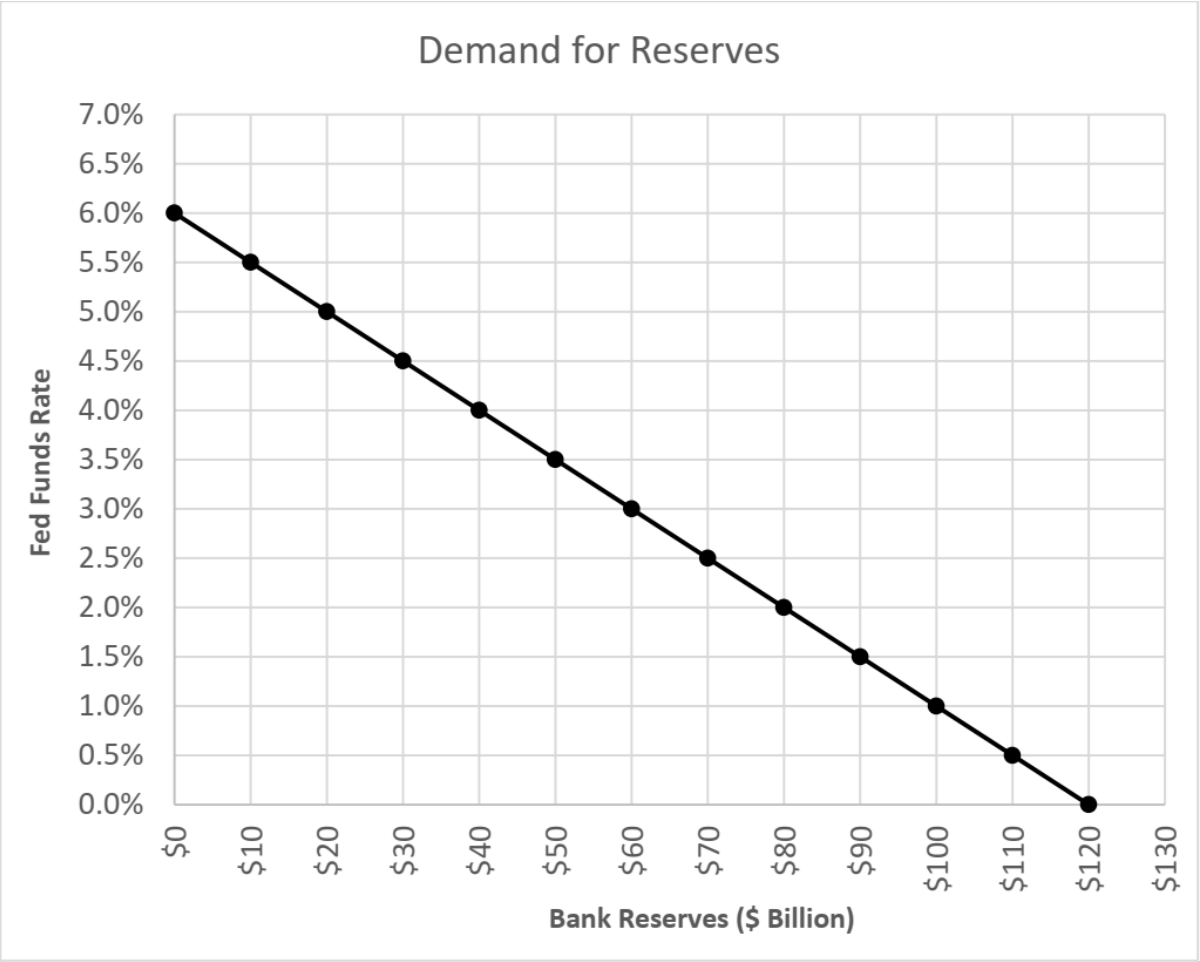
Problem 5. Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is \$60 billion. Suppose the Fed reduces the discount rate to 2.50 percent. What is the fed funds rate?



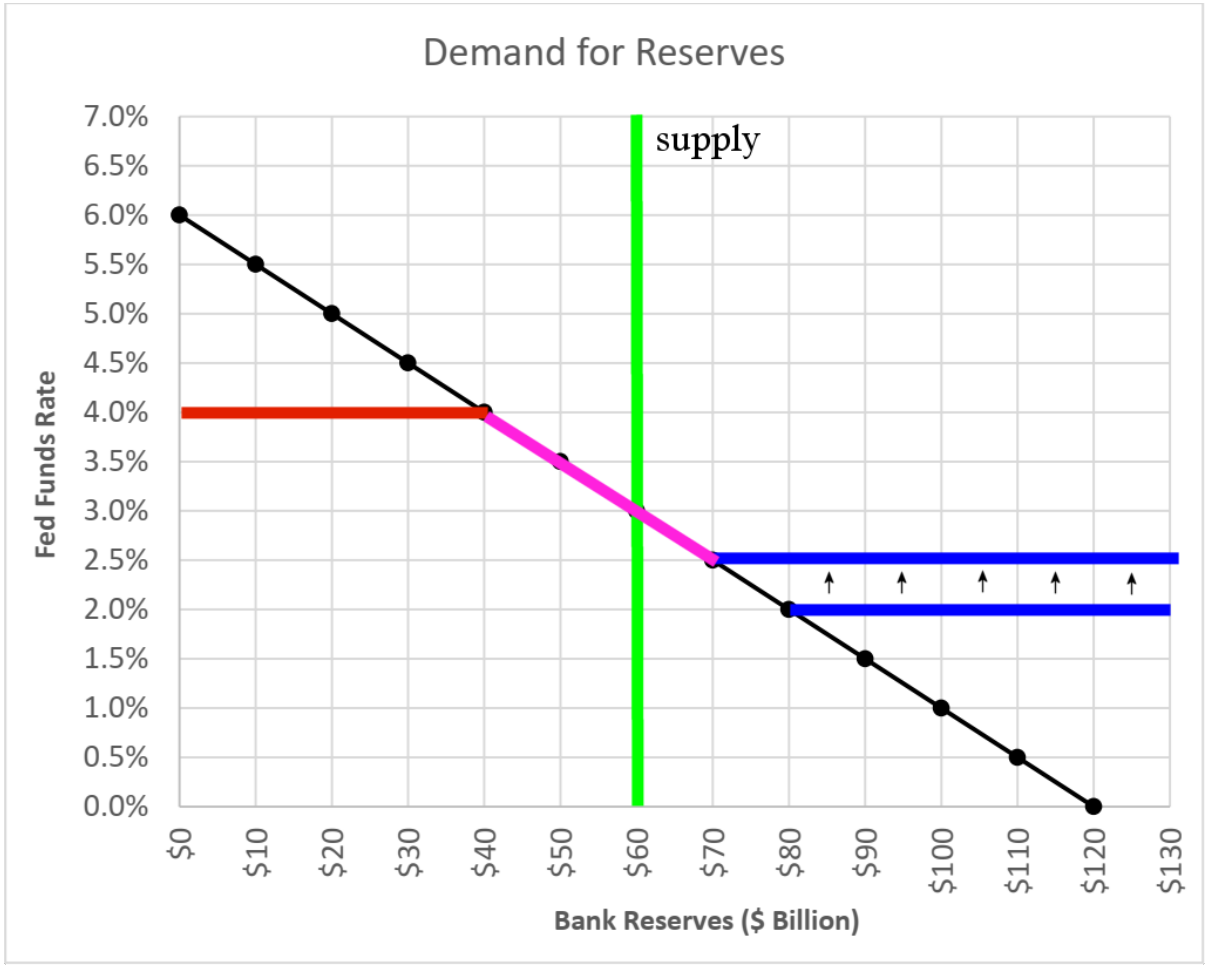
Answer 5. Drop the discount rate all the way to 2.5 percent and then the supply line intersects at the discount rate. So the fed funds rate is 2.5%.



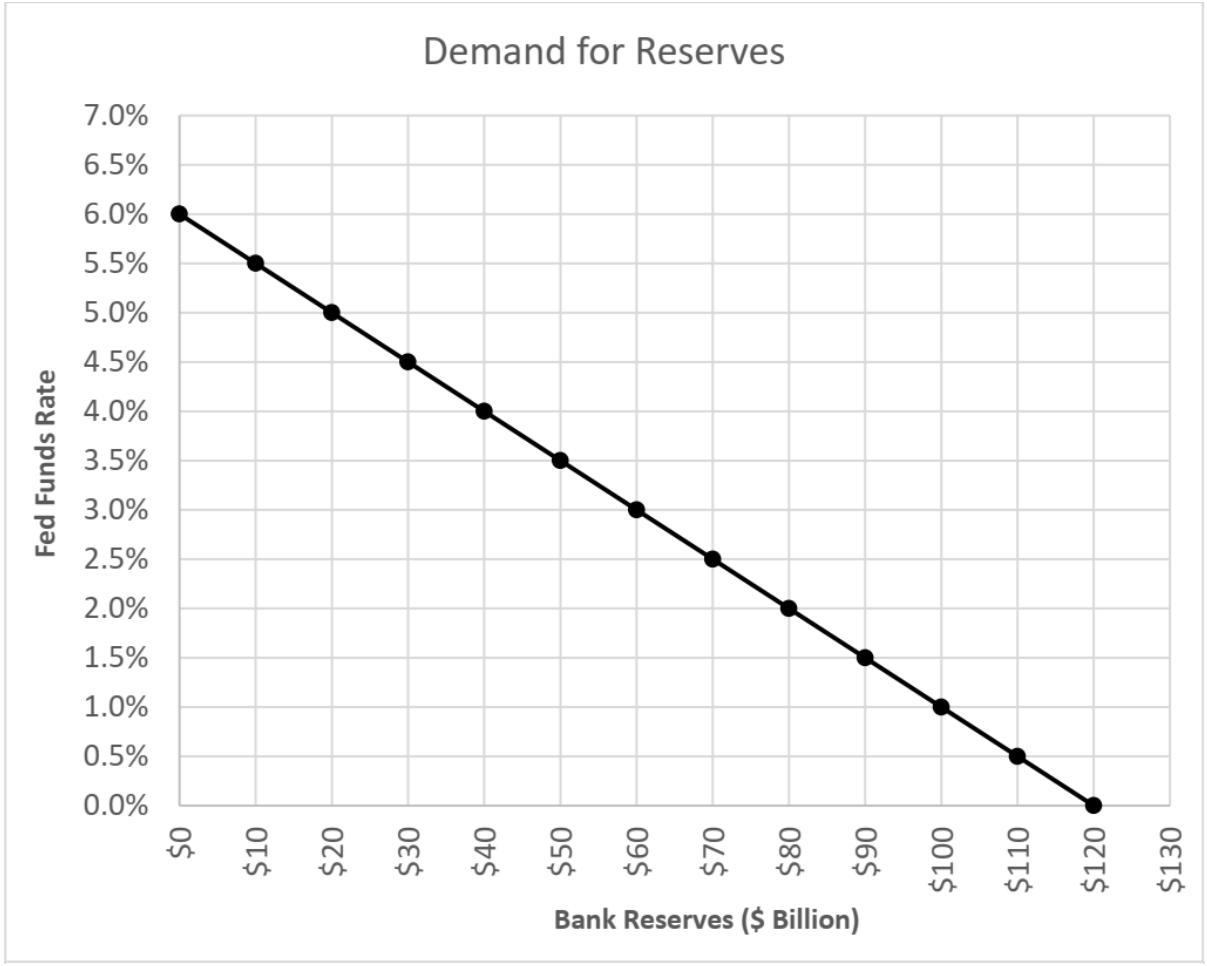
Problem 6. Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is $60 billion. Suppose the Fed increases the interest rate on reserves up to 2.5 percent. What's the fed funds rate?



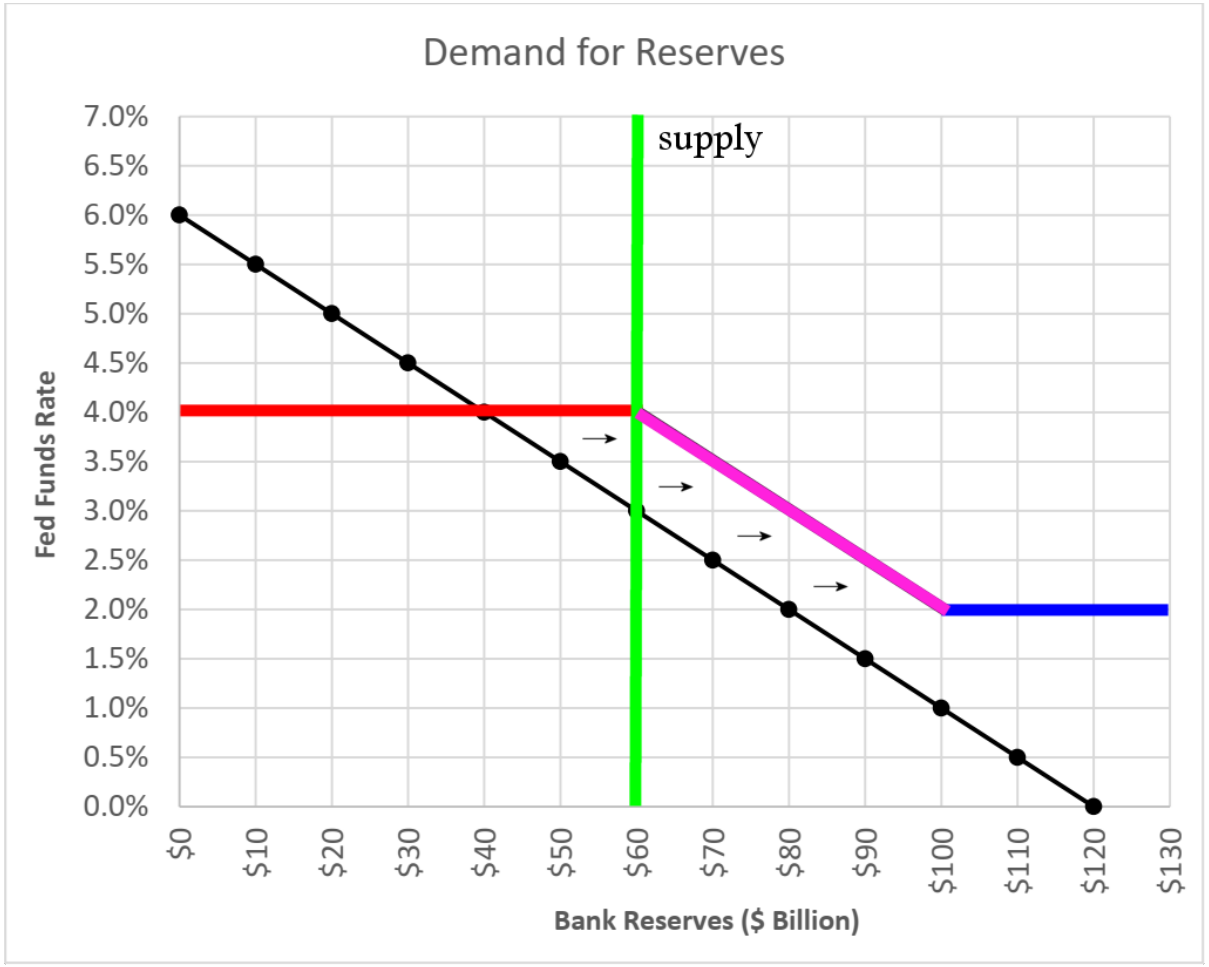
Answer 6. Move the IOR segment (the blue one) up to 2.5 percent. The intersection is still at 3%, however, so there's no change.



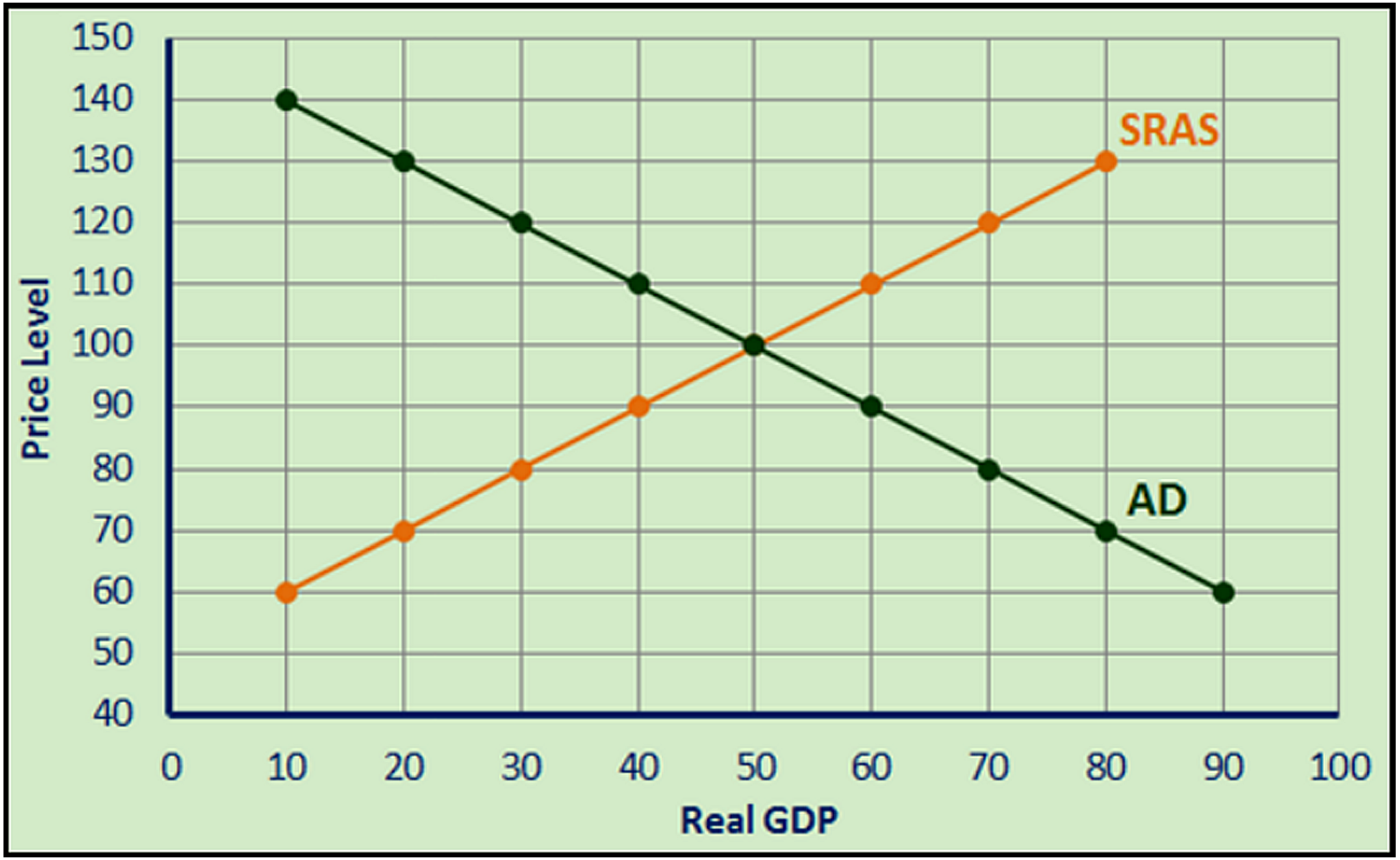
Problem 7. Consider the (partial) demand for reserves function as shown below. The discount rate is 4.0 percent and interest on reserves is 2.0 percent. Suppose that the supply of reserves is \$60 billion. Suppose the Fed increases the required reserve ratio so that the demand for reserves increases by \$20. What's the new federal funds rate?



Answer 7. Take the demand curve and shift the whole thing over to the right by $20. The new intersection is at 4%.



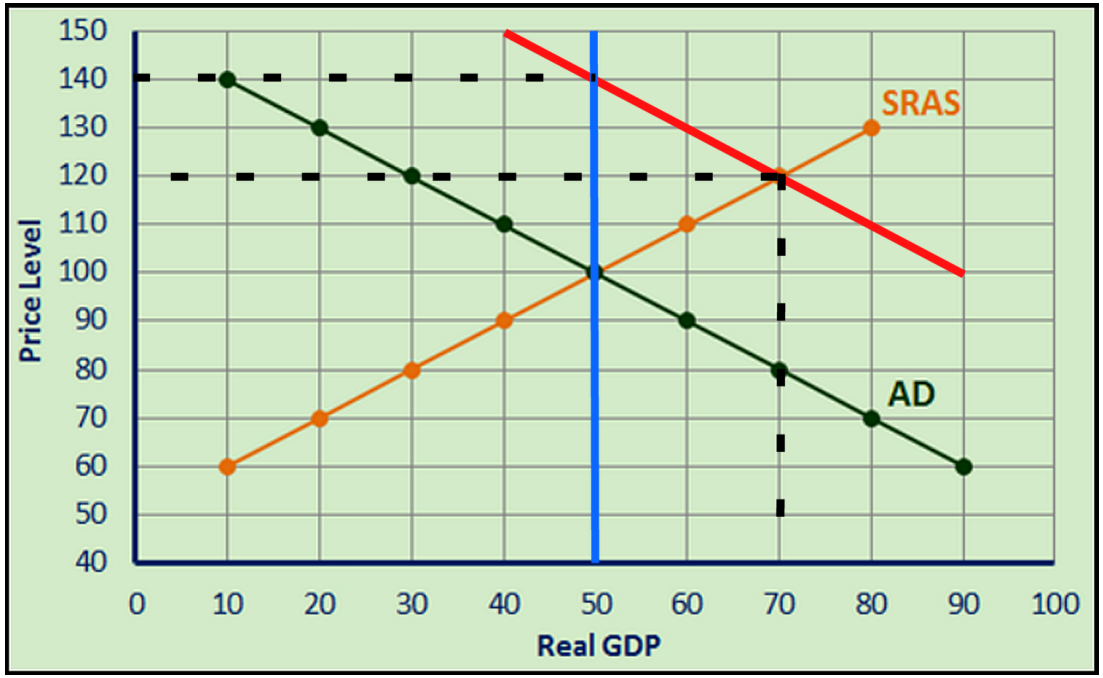
Problem 8. Currently $Y = 50$, $Y_p = 50$, and $P = 100$. The expenditure multiplier equals 5. All else the same, transfer payments TR increase by 10 units through deficit financing. Find the short-run and long-run equilibria.



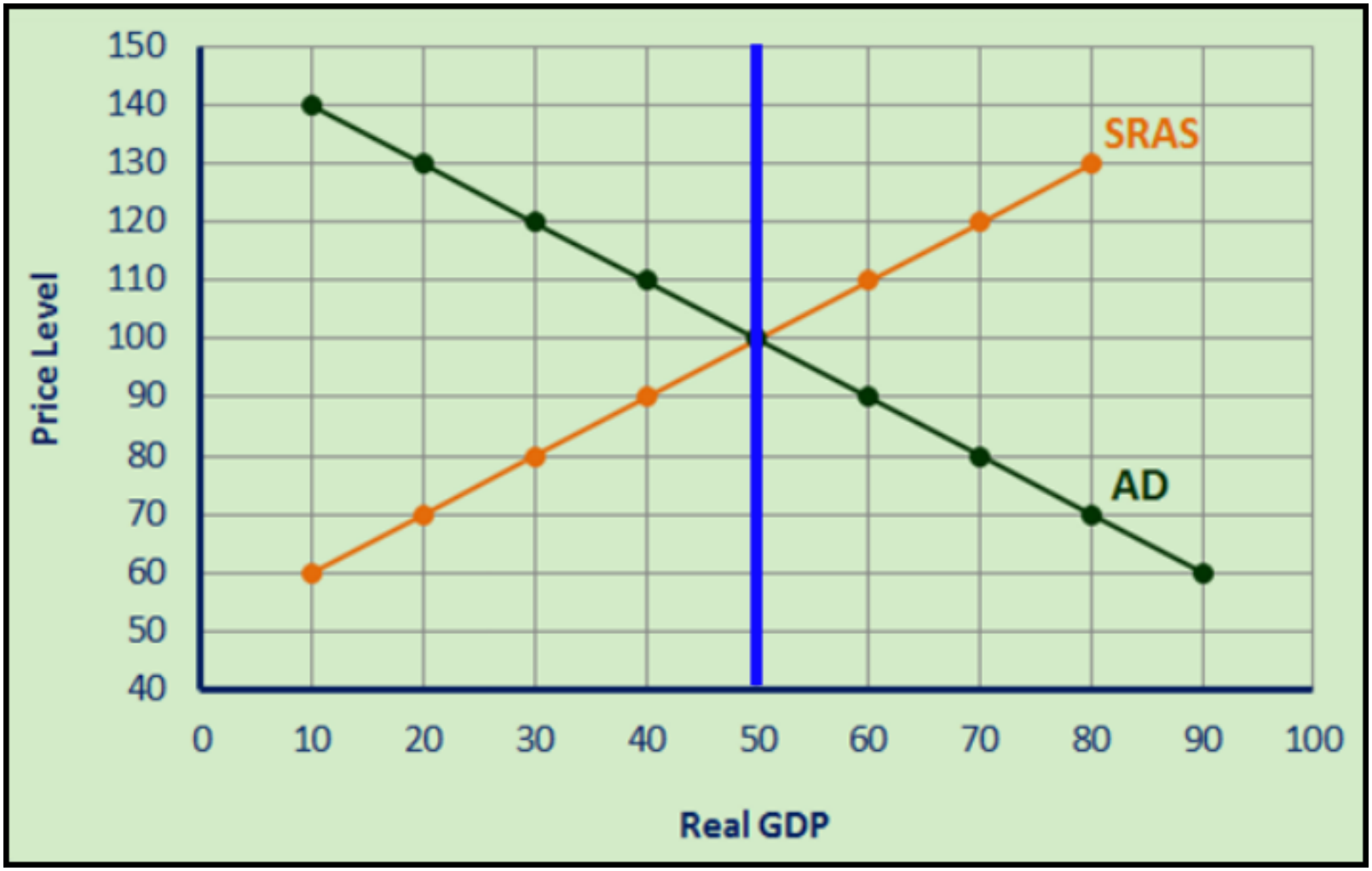
Answer 8. Since the expenditure multiplier is 5, it follows that

$$\frac{1}{1-MPC} = 5 \implies MPC = 0.80.$$

So when transfer payments increase by 10 units, it means disposable income Y_d increases by 10 units and therefore consumption initially increases by $MPC \times \Delta Y_d = 8$ units. Then from the expenditure multiplier, the overall increase in consumption (and therefore AD) will be $8 \times 5 = 40$. So shift AD to the right by 40 units. The short-run equilibrium is then $(70, 120)$ and the long-run equilibrium is $(50, 140)$.



Problem 9. Suppose the expenditure multiplier equals 5. Show the effect of a decrease in taxes by 10 units in both the short run and long run.



Answer 9. First we should find out what MPC is.

$$\frac{1}{1-MPC} = 5 \implies MPC = 0.80.$$

Because TX decreases by 10, it means that Y_d increases by 10. This means that consumption increases by $0.80 \times 10 = 8$. Now use the multiplier effect on this increase in consumption; AD will shift to the right by $8 \times 5 = 40$ and we get the same answer as above.

Two takeaways. First, an increase in transfers payments and a decrease in taxes have the same expansionary effect. (Symmetrically, a decrease in transfer payments and an increase in taxes have the same contractionary effect.) Second, changes in TX and TR need to first be converted in to changes in C because TX and TR are not part of $Y = C + I + G + NX$. Once we have the change in C, however, then we can start the multiplier process and shift AD accordingly.

On the other hand, if we are told that there is a direct change in C, I, G, or NX, then we can just multiply that change by the multiplier and be on our way.