

**Answer key for Practice Mid-term**

**PART A: CONCEPT AND KNOWLEDGE**

**A1.a.** Expected present discounted value

It is the value today of the expected sequence of future payments.

**A1.b.** Yield to maturity

It is constant interest rate that makes the bond price today equal to the present value of future payments on the bond.

**A1.c.** Consumption smoothing

Regardless of whether the increase in income occurs in the current period or the future period, the forward-looking consumer spreads it over consumption in both periods to make consumption smooth.

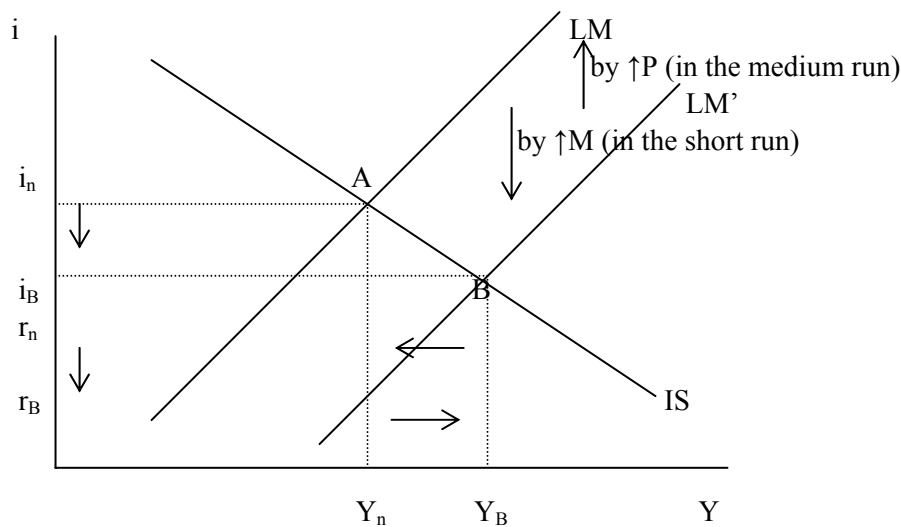
**A.2.**

i) In the short run:

The higher rate of growth of nominal money leads to an increase in the real money stock ( $M/P$ ) because the faster increase in nominal money will not be matched by an equal increase in the price level. The increase in the real money stock causes a shift in the  $LM$  curve down. For a given level of output, the increase in the real money stock leads to a decrease in the nominal interest rate. If we assume that people and firms do not revise their expectations of inflation immediately, the  $IS$  curve does not shift. Given expected inflation, a given nominal interest rate corresponds to the same real interest rate and to the same level of spending and output. The economy moves down the  $IS$  curve and thus, output is higher, the nominal interest rate is lower, and given expected inflation, so is the real interest rate.

ii) In the medium run:

So long as the real interest rate is below the natural real interest rate, output is higher than the natural level of output, and unemployment is below its natural rate. From the Phillips curve relation, lower unemployment than the natural rate of unemployment causes higher inflation. As inflation increases, the real money stock falls, resulting in an increase in the nominal interest rate and given expected inflation, so does the real interest rate. In the medium run, the real interest rate increases back to its initial value, output is back to the natural level of output, unemployment is back to the natural rate of unemployment, and inflation is no longer changing. Therefore,  $r = r_n$ ,  $Y = Y_n$ ,  $u = u_n$ ,  $\pi = g_m$ , &  $i = r_n + g_m$



**PART B: ALGEBRAIC AND GRAPHICAL ANALYSIS**

**B1.a.**  $\$V_t = \$500 / (1 + 0.20) = \$416.67$

**B1.b.**  $i_t = r_t + \pi_{t+1}^e \Rightarrow 10\% = r_t + 2\% \Rightarrow r_t = 8\%$

**B1.c.** The coupon rate = coupon payment / the face value =  $\$2000 / \$10,000 = 20\%$

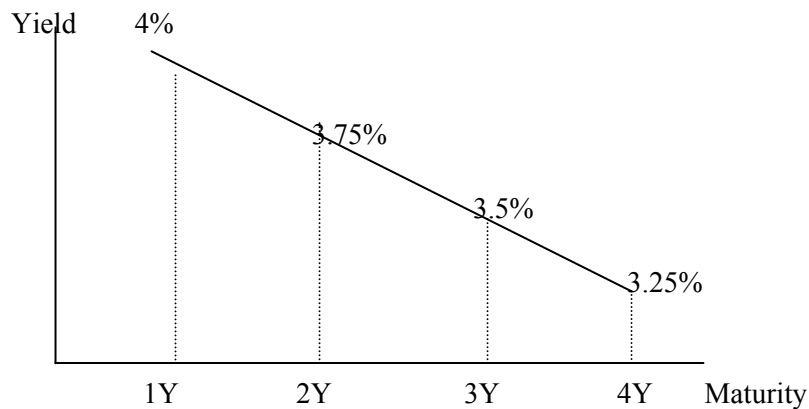
**B1.d.**  $\$Q_t = \$25 / (1 + 0.05) + \$500 / (1 + 0.05) = \$500$ .

**B2.** Suppose that the annual interest rate this year is 4% and financial market participants expect the annual interest rate to fall to 3.5% next year, to 3% two years from now and to 2.5% three years from now.

**B2.a.**  $i_{2t} = \frac{1}{2}(4\% + 3.5\%) = 3.75\%$ ;  $i_{3t} = \frac{1}{3}(4\% + 3.5\% + 3\%) = 3.5\%$ ;

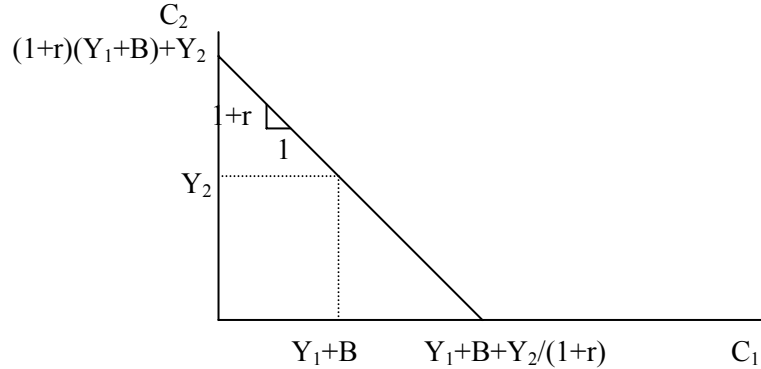
$i_{4t} = \frac{1}{4}(4\% + 3.5\% + 3\% + 2.5\%) = 3.25\%$

**B2.b.**



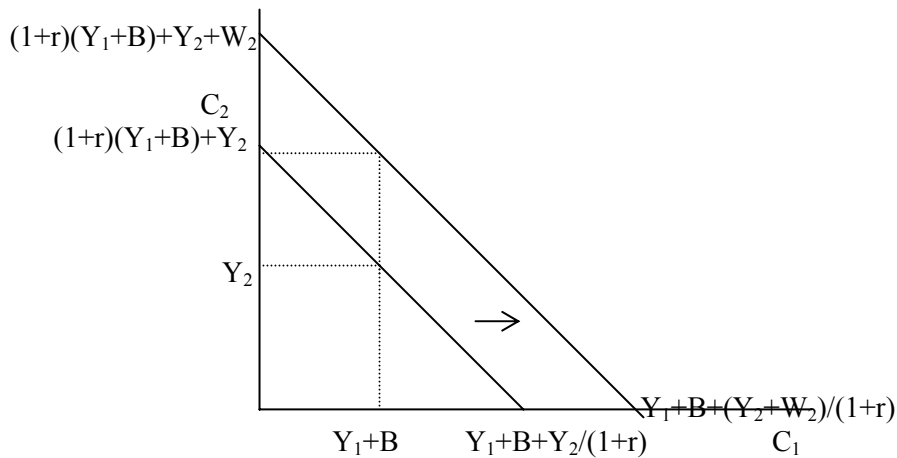
**B2.c.** We have an inverted yield curve. An inverted yield curve implies by the Expectations hypothesis that the expected future interest rate is lower than the current interest rate. These expectations could arise from a belief that the *IS* curve will shift to the left in the future (and output will fall, like recession), say because the consumer confidence in the future economy falls or future investment is expected to fall or both. Hence, this yield curve indicate that a recession is coming.

**B3.a.** Period 1:  $S = Y_1 + B - C_1$ ; Period 2:  $C_2 = (1+r)S + Y_2$ . Then, we combine two constraints:  
 $C_2 = (1+r)(Y_1 + B - C_1) + Y_2 \Rightarrow C_1 + C_2/(1+r) = Y_1 + B + Y_2/(1+r)$



**B3. b.** As she expect extra income at the period 2,  $W_2$ , now her available resources are  $Y_1 + B + Y_2/(1+r) + W_2/(1+r)$ , resulting in an increase in the present value of her life-time resources. Now, new intertemporal budget constraint:  $C_1 + C_2/(1+r) = Y_1 + B + Y_2/(1+r) + W_2/(1+r)$

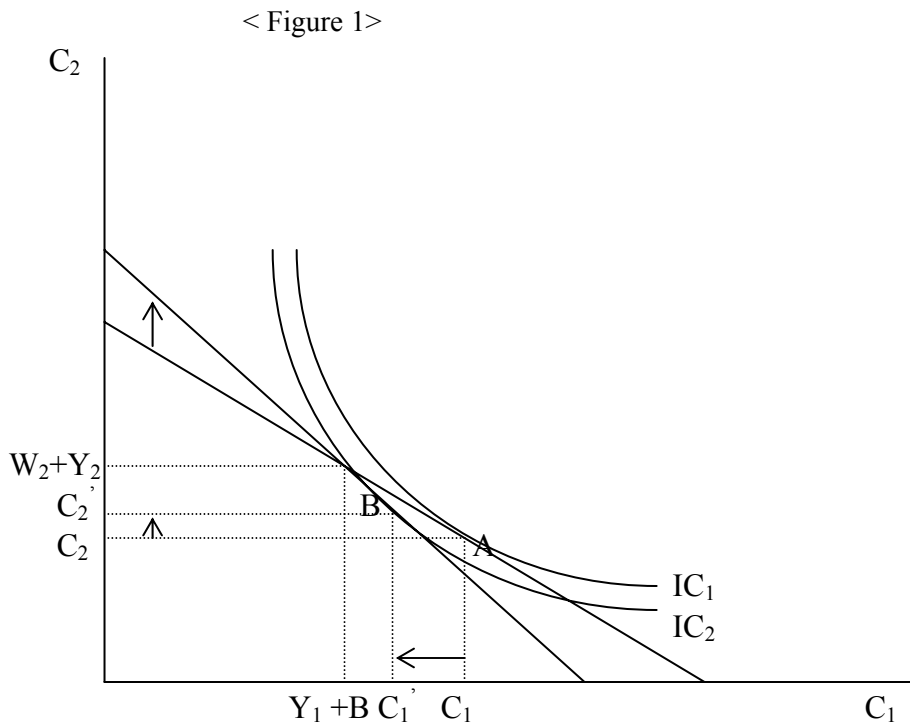
Graph: The original intertemporal budget constraint shifts outward in parallel.



**B3.c.** We can break the effect on consumption from this change into an income and substitution effect. The income effect is the change in consumption that results from the movement to a different indifference curve. Because the consumer is a borrower, the increase in the interest rate makes the consumer worse off—that is, he or she cannot achieve as high an

indifference curve. If consumption in each period is a normal good, this tends to reduce both  $C_1$  and  $C_2$ .

The substitution effect is the change in consumption that results from the change in the relative price of consumption in the two periods. The increase in the interest rate makes second-period consumption relatively less expensive; this tends to make the consumer choose more consumption in the second period, and less consumption in the first period. On net, we find that for a borrower, first-period consumption falls unambiguously when the real interest rate rises, since both the income and substitution effects push in the same direction. Second-period consumption might rise or fall, depending on which effect is stronger. In figure 1, we show the case in which the substitution effect is stronger than the income effect, so that  $C_2$  increases.



### PART C: APPLICATION

**C1.** The current one-year rate will fall with no change in the expected future rate. The two-year rate, given that it is an average of the two one-year rates, will fall. The change in the two-year rate will approximately equal half the change in the one-year rate. The yield curve will shift down and get steeper. What happens to stock prices depends on whether this was fully or partially expected. If fully anticipated, stock prices do not change. If at least partially unexpected, stock prices will rise because of the interest rate effect and the higher output (changes in which were unexpected)