**CAUTION:** Late assignments will not be accepted – no exceptions.

**Note 1:** Please make an EXTRA copy of your exercise to bring to class on the due date for use in class discussion after you turn in your exercise.

**Note 2:** Students are permitted to work together in study groups on this exercise, but each student is asked to separately prepare and turn in their exercise answer. The techniques covered in this exercise are essential tools for subsequent exercises and exams, so “free riding” on other people’s work should definitely be avoided!

**Effects of a Decrease in the Government Budget Deficit**

**Background Materials:**
- GDP-Related Terms and Concepts (Notes by L. Tesfatsion)
  
  http://www.econ.iastate.edu/classes/econ302/tesfatsion/bht2.htm

- “The Basic Short-Run IS-LM Model with Sticky Prices” (PACKET 6)

Consider an economy described by the following equations in some period $T$:

1. $Y = C + I + G + NE$
2. $C = a + b[1 - t]Y$
3. $I = e - dR$
4. $NE = g - mY - nR$
5. $G - tY = D$
6. $M/P = kY - h[R + INF]$

**Period-$T$ Endogenous Variables:**

$Y =$ real income

$C =$ real consumption

$I =$ real gross investment

$R =$ real interest rate on bonds

$NE =$ real net exports

$G =$ real government expenditures
Admissible Exogenous Variables:

\( D = \) positive target level for the real government budget deficit

\( t = \) income tax rate with \( 0 < t < 1 \)

\( P = \) positive price level

\( M = \) positive nominal money supply

\( INF = \) positive inflation rate

\( b = \) marginal propensity to consume satisfying \( 0 < b < 1 \)

\( m = \) marginal propensity to import satisfying \( 0 < m < 1 \)

\( a, e, d, g, n, k, h = \) positive constants

**QUESTION 1** [2 Points Total, 1/2 Point Each Part]

**Part Q1.A:** Proceeding carefully step by step, as in Course Packet 6, derive the IS equation for the economy described by (1)-(6) as a mathematical equation depicting \( R \) as a function of \( Y \) in which no other endogenous variables appear. Show your work.

**Part Q1.B:** Provide a careful economic interpretation for the IS equation derived in Part Q1.A. That is, carefully explain the economic meaning (as opposed to simply the mathematical form) of this IS equation.

**Part Q1.C:** Construct a carefully justified and labeled graph that depicts the form of this IS equation in the \( Y - R \) plane (i.e., that depicts the “IS Curve”).

**Part Q1.D:** Determine graphically how the position of this IS curve in the \( Y - R \) plane is affected by a decrease in the government budget deficit \( D \), justifying your assertions carefully in terms of the provided model assumptions.

**QUESTION 2** [2 Points Total, 1/2 Point Each Part]

**Part Q2.A:** Proceeding carefully step by step, as in Course Packet 6, derive the LM equation for the economy described by (1)-(6) as a mathematical equation depicting \( R \) as a function of \( Y \) in which no other endogenous variables appear. Show your work.

**Part Q2.B:** Provide a careful economic interpretation for the LM equation derived in Part Q2.A. That is, carefully explain the economic meaning (as opposed to simply the mathematical form) of this LM equation.
Part Q2.C: Construct a carefully justified and labeled graph that depicts the form of this LM equation in the \( Y - R \) plane (i.e., that depicts the “LM Curve”).

Part Q2.D: Determine graphically how the position of this LM curve in the \( Y - R \) plane is affected by a decrease in the government budget deficit \( D \), justifying your assertions carefully in terms of the provided model assumptions.

QUESTION 3 [5 Points Total]

Part Q3.A [1 Point] Define a (reduced-form) solution for the model economy (1)-(6) to be a point \( (Y^o, R^o) \) in the \( Y - R \) plane where the IS and LM curves determined in questions Q1 and Q2 have an intersection point. [Equivalently, by construction, this is a point at which all six equations (1)-(6) are satisfied.] Using the graphical results you derived in questions Q1 and Q2 for the IS and LM curves, depict the solution \( (Y^o, R^o) \) using a carefully labeled graph in the \( Y - R \) plane.

Part Q3.B [2 Points] Using your answers for questions Q1 and Q2, determine graphically how the solution \( (Y^o, R^o) \) depicted in Part Q3.A is affected by a decrease in the government budget deficit \( D \). Justify your assertions carefully in terms of the provided model assumptions.

Part Q3.C [2 Points] Using your findings in Part Q3.B, determine how the solutions \( I^o \) and \( NE^o \) for investment \( I \) and net exports \( NE \) are affected by a decrease in the government budget \( D \). Justify your assertions carefully in terms of the provided model assumptions.

QUESTION 4 [4 Points]: Consider the following quotation from a previous U.S. Administration:

“A major part of this Administration’s macroeconomic strategy has been its effort to reduce the (government) budget deficit. Reducing the deficit is important because government borrowing to finance budget deficits raises real interest rates, crowding out business investment that is vital for raising productivity and economic growth. And to the extent that budget deficits spill over into current account deficits, they lead to a transfer of national wealth abroad.”

Using your findings from question Q3 regarding the short-run effects of a decrease in the government budget deficit \( D \), discuss carefully the extent to which the model economy for the current exercise does (or does not) provide theoretical support for the above quotation.