A diagnostic test for Intermediate Macroeconomics (April 9, 2014)

Student ID: __________________
Name: __________________

If you answer the following three questions satisfactorily without any reference, then you may be qualified to take this course. Otherwise, an unfavorable outcome could result.

1. A production function is represented by \( y = f(k) \) in which \( y \) (output) is determined by \( k \) (physical capital). Suppose that \( f(0) = 0 \), \( f'(k) > 0 \), and \( f''(k) < 0 \). In a steady state where \( y, k, \) and \( c \) (consumption) are constant over time, \( y = f(k) = c + \delta k \) holds. \( \delta \) denotes a positive depreciation rate. Establish a condition under which \( c \) is maximized in a steady state.

2. Suppose that a macroeconomy is described by the following IS system.

\[
\begin{align*}
Y &= C + G, \\
C &= c(Y - T) + c_0,
\end{align*}
\]

where \( Y, C, G, \) and \( T \) denote GDP, aggregate consumption, government expenditures, and lump-sum taxes. Two parameters satisfy \( 0 < c < 1 \) and \( c_0 > 0 \). Demonstrate that a multiplier effect of \( G \) on \( Y \) is equal to one when \( G \) is financed entirely by \( T \).

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3. You have the following time-series data.

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<tbody>
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<td>2000</td>
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<td>2003</td>
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Now, you may approximate a causal relationship from \( x \) to \( y \) by a linear equation \( y = \alpha x + \beta \).

Demonstrate how \( \alpha \) and \( \beta \) are determined in general and in this particular case.