Answer the following questions True, False, or Uncertain. Briefly explain your answers. No credit without explanation. (8 points each).

1. Tax cuts decrease national saving.
   UNCERTAIN. This statement is false if Ricardian Equivalence holds. National saving is the sum of government saving, \((T - G)\), and private saving, \((Y - T - C)\). The tax cut lowers government saving. However, private saving might rise by the same amount if people anticipate the higher future taxes. They simply save the tax cut, and continue to consume the same amount as before. However, if Ricardian Equivalence doesn’t hold, and households spend part of their extra disposable income, then national saving would in fact decline.

2. The unemployment rate is zero when the labor market clears.
   FALSE. As discussed in class, it takes time to match workers to firms. These ‘search frictions’ imply that even in a well functioning labor market there will always be some amount of unemployment, although it may be difficult to precisely estimate what this number is. Hence, even when the labor market ‘clears’ there will be some unemployment.

3. In the Solow model, an increase in the savings rate increases the economy’s growth rate.
   TRUE and FALSE. In the Solow model, an increase in the savings rate will produce a temporary increase in the growth rate, but not a permanent increase.

4. Productivity increases cause current account surpluses.
   UNCERTAIN. It depends on whether it is temporary or permanent. A temporary productivity increase does not affect the future MPK; it just raises current output and income. Hence, it raises saving (consumption-smoothing) and does not affect investment. This would produce a current account surplus (or reduce a pre-existing deficit). If the productivity increase were permanent, then saving would not respond, since households would simply raise consumption in proportion to their permanently higher income. However, now investment would increase. The combination of rising investment, with little or no change in saving produces a current account deficit.
5. Faster money growth causes inflation to increase.

UNCERTAIN. We know from the quantity equation that \( \frac{\Delta M}{M} + \frac{\Delta V}{V} = \frac{\Delta P}{P} + \frac{\Delta Y}{Y} \). Hence, an increase in \( \frac{\Delta M}{M} \) must be matched by some combination of an increase in \( \frac{\Delta P}{P} \), an increase in \( \frac{\Delta Y}{Y} \), or a decrease in \( \frac{\Delta V}{V} \). Empirically, in the long-run, an exogenous increase in \( \frac{\Delta M}{M} \) will produce a matching increase in \( \frac{\Delta P}{P} \), so in that sense the answer is true. However, if \( \frac{\Delta M}{M} \) is rising in combination with an increase in growth, which produces an increase in money demand, inflation might not be affected at all.

The following questions are short answer. Briefly explain your answer. Clarity will be rewarded.

6. (20 points). Suppose the (per capita) production function is \( y = \sqrt{k} \). Also suppose the savings rate, \( s \), is 16%, the population growth rate, \( n \), is 3%, and the depreciation rate, \( \delta \), is 5%. (There is no technological progress, i.e., \( g = 0 \)). (a) Calculate the economy’s steady-state capital/labor ratio and income per capita. (b) Is this economy above or below the Golden Rule?

(a) Steady-state: \( sk^{1/2} = (n + \delta)k \). Therefore, \( k = \frac{s}{(n + \delta)} \).\( ^{2} \). Plugging-in the numbers gives, \( k = \left(\frac{.16}{.08}\right)^{2} = 4 \). Therefore, \( y = \sqrt{4} = 2 \).

(b) From class, we know the Golden Rule saving rate is \( \alpha \) (capital’s share), which in this case equals 1/2. Therefore, since \( s < .5 \), we know the economy is below the Golden Rule.

7. (20 points). On the planet Vulcan, the velocity of money is constant. Real GDP grows by 4% per year, the money supply grows by 10% per year, and the nominal interest rate is 9%. What is the real interest rate?

Using the notation from class, when velocity is constant we know

\[
\mu = \pi + g
\]

From the Fisher equation, we know

\[
i = r + \pi
\]

Therefore, \( \mu = (i - r) + g \). Plugging in the numbers gives \( .10 = .09 + .04 - r \). Therefore, \( r = .03 \).

8. (20 points). Compare and contrast how ‘closed economies’ and ‘small open economies’ respond to a fiscal expansion. Use graphs if you want.

A fiscal expansion corresponds to \( G \uparrow \) or \( T \downarrow \). A temporary fiscal expansion causes a decline in saving. This raises interest rates in a closed economy. In a small open economy it produces a current account deficit instead. A permanent fiscal expansion does not affect either saving or investment (at least to a first-order approximation). Hence, the the ‘responses’ would be the same in both cases. (See lecture 7 slides for more discussion).