I. Uncovered *versus* Covered Interest Parity

(a) Explain why it is often called a *risky* arbitrage condition.
Uncovered interest parity is a risky arbitrage condition because at date *t* when an agent decides to buy German bonds, s/he is not sure what the exchange rate will be at date *t+1* (when s/he will be converting the proceeds of his/her investment back into dollars). Therefore the agent is not protected from the exchange rate risk (unpredictable movements in the exchange rate).

(b) Covered interest parity is a riskless arbitrage condition that implies that the rates of return on dollar deposits are the same as on covered foreign deposits.
If you invest \$1 in U.S. bonds, in one year your investment will be worth $\$(1+i_t)$.
Alternatively, at date *t* you can:

- convert \$1 into DM, which will yield $\frac{\$1}{E_t}$;
- buy German bonds using DM, which will yield $\frac{1}{E_t}(1+i_t^*)$ in one year;
- and agree to sell this amount forward at a forward rate F, which guarantees you $\$\frac{1}{E_t}(1+i_t^*)F_t$.

In order for both U.S. and German bonds to be held, it has to be the case that the returns on both types of investment are the same. Arbitrage therefore requires that $\$(1+i_t) = \$\frac{1}{E_t}(1+i_t^*)F_t$.

We can rewrite is as $1+i_t = (1+i_t^*)(1+\frac{F_t - E_t}{E_t})$.

This can be further simplified to $i \approx i^* + \frac{F-E}{E}$. Note that $\frac{F-E}{E}$ is a forward premium on DM against dollars.

(c) In order for these two arbitrage conditions to be consistent with each other is has to be the case that $F_t = E^e_{t+1}$.

II. True/False/Uncertain

(a) *False*. Given the expected future exchange rate and the foreign interest rate, an increase in the domestic interest rate leads to a decrease in the exchange rate (an appreciation). This follows directly from $E = \frac{\overline{E}^e}{1 + i - i^*}$.

(b) *True*. A contractionary monetary policy shifts LM curve up. This leads to a higher interest rate and lower output in equilibrium. Interest parity implies that exchange rate decreases (appreciates).

(c) *False*. Under fixed exchange rates, monetary policy cannot be used as a policy instrument. Central Bank must adjust money supply so as to maintain equality between the domestic and foreign interest rates.

(d) *False*. Fiscal policy is more powerful under fixed exchange rates since Central Bank must accommodate all movements in the IS curve (by shifting LM curve so as to maintain equality between the domestic and foreign interest rates).

(e) *Uncertain*. One way to reduce or eliminate the U.S. trade deficit would be a contractionary fiscal policy, reducing government spending or increasing taxes. Either of these would also reduce the budget deficit. But fiscal policy is not the only way to reduce a trade deficit. Monetary policy, for example, can also be used.

(f) *True*. A fear of devaluation will increase the attractiveness of foreign bonds. With a floating exchange rate, this would cause domestic currency to depreciate. But with a fixed exchange rate, the authorities must raise the domestic interest rate until domestic bonds are just as attractive as foreign bonds. The rise in the interest rate will decrease investment spending, and – through the multiplier – decrease output.

III. Large *versus* Small Countries

(a) When $a = 0$, $i^* = \bar{i}^*$. The U.S. interest rate has no impact on the foreign interest rate.

When $a = 1$, $i^* = i$. The foreign rate is completely determined by the U.S. interest rate.

When $a = \frac{1}{2}$, $i^* = .5\bar{i}^* + .5i$. The foreign rate is the average of the foreign target rate and U.S. rate.

(b) When $i = 4\%$, $i^* = .5(.06) + .5(.04) = .05$.

When $i = 5\%$, $i^* = .5(.06) + .5(.05) = .055$.

When $i = 4\%$ and $i^* = 5\%$, interest parity implies: $E = \dfrac{\overline{E}^e}{1+i-i^*} = \dfrac{10}{1+.04-.05}$.

When $i = 5\%$ and $i^* = 5.5\%$, interest parity implies: $E = \dfrac{\overline{E}^e}{1+i-i^*} = \dfrac{10}{1+.05-.055}$

(c) In a closed economy, monetary policy works entirely through its impact on the domestic interest rate, rather than through the exchange rate. The larger the parameter a, the more monetary policy will influence the foreign interest rate, and, therefore, the less it will affect – and work through – the exchange rate. Thus, with a larger value for a, the more monetary policy works as it does in a closed economy.

IV. A Simplified Open Economy IS-LM model

(a) ν is positive. Increase in the real exchange rate (depreciation) improves the trade balance.

(b) m is marginal propensity to import. It indicates the rise in imports per dollar increase in income.

(c) $Z = A + NX = \overline{A} + cY - bi + W - mY + \nu\varepsilon$

(d) $Y = Z = A + NX = \overline{A} + cY - bi + W - mY + \nu\varepsilon$

$$Y = \frac{\overline{A} - bi + W + \nu\varepsilon}{1 - c + m}$$

(e) A rise in ε raises domestic output by $\dfrac{\nu}{1-c+m}$. The rise is larger the more responsive the trade balance is to the real exchange rate, and the larger is $\dfrac{1}{1-c+m}$ - the simple open economy multiplier.

(f) $Y = \dfrac{1}{k}\left(\dfrac{M}{P} + hi^*\right)$

The home real money supply and the world interest rate determine the equilibrium level of income that is consistent with equilibrium in the financial markets.

(g) $\dfrac{1}{k}\left(\dfrac{M}{P} + hi^*\right) = \dfrac{\overline{A} - bi + W + \nu\varepsilon}{1 - c + m}$

$$\varepsilon = \frac{1-c+m}{k\nu}\left(\frac{M}{P}\right) + \frac{(1-c+m)h+kb}{k\nu} i^{*} - \frac{\overline{A}+W}{\nu}$$

Fiscal expansion (a rise in $\overline{A}$) leads to real appreciation, while monetary expansion (a rise in $\frac{M}{P}$) leads to real depreciation.