January 2011, Macroeconomics comprehensive exam, Hanes' questions
Look over the entire examination before you begin.

1) Consider two economies, A and B, that can be described by the Malthusian model. The level of the "subsistence" real wage is the same in A and B. In A, occasional plagues strike, killing off people until the surviving population develops immunity. In B, an efficient health service prevents plagues with vaccines. Consider the mean value of the real wage in each economy, averaged over a very long span of time - one or two hundred years. Is this long-run mean real wage higher in A, higher in B, or the same in both economies? Explain, using appropriate graphs. *In A, a plague causes the population to fall below the equilibrium population, raising the real wage. As the survivors develop immunity, the population rises and the real wage falls, back to the equilibrium. In B, population and real wage remain at the equilibrium. So on average over long spans of time, the real wage is higher in A. Note: in A, the average real wage over long spans of time is NOT the same as the equilibrium real wage.*

2) Consider an open economy where domestic inflation, domestic expected inflation and ROW expected inflation are all fixed (π, π^e and π^{e*} are all fixed). Net exports depends only on the exchange rate according to a function $NX(\epsilon)$. What happens to the economy if there is a change in expectations of the future exchange rate: "before," people were expecting no future change in the exchange rate ("static exchange-rate expectations"); suddenly, people come to expect the exchange rate will *appreciate* in the future. Meanwhile, there is *no* change in the foreign interest rate *i**. For each case below, *clearly state* what happens to:
- domestic output
- the domestic interest rate
- the exchange rate ϵ
- capital flow CF

Illustrate with appropriate graphs!

a) Perfect capital mobility, reserve gain zero, central bank fixes the money supply, exchange rate floats. *Use the Mundell-Fleming, IS*/LM* graph. Expected appreciation causes r to fall below r*, so the LM* shifts back and the IS* shifts out. Result: Y falls, r falls, exchange rate falls (appreciates), because erate appreciates NX falls so CF must increase. Note: change in NX tells you what must happen to CF.*

b) Imperfect capital mobility, reserve gain zero, central bank follows an interest-rate rule $r(\pi,Y)$, exchange rate floats.

*Use the graph with Y on horizontal axis, r on vertical axis, IS** and MP. Also use equation*
$CF(r - r^* - \frac{\dot{\epsilon}^e}{\epsilon}) + NX(\epsilon) = 0$

AT given r and r, CF would increase, which means NX would fall, which means exchange rate would fall (appreciate). Hence IS* shifts back. Result: Y falls, r falls, exchange rate falls, because erate appreciates NX falls so CF must increase.*

c) Imperfect capital mobility, reserve gain zero, central bank follows an interest-rate rule $r(\pi,Y)$, exchange rate floats. *My mistake: this is same as b).*

3) Consider two economies, Saxonia and Gallia. In both countries, some companies are funded by collateralized loans; others are funded by selling stock (equity). Stock is a claim to a share of the company's profits. In Saxonia, companies are required to publish detailed accounts of their operations' profit and loss, prepared by outside accountants, with severe penalties for firm managers who falsify information. In Gallia, companies are not required to publish such accounts. In which country would you expect to see a *larger* fraction of companies funded by collateralized loans (and hence a smaller fraction funded by stock)? Explain why.

This is about model of information asymmetry and loans. Stock is what we called "share contract" in the model. Information disclosure makes information more symmetric, makes share contracts more possible. So larger fraction of companies will be funded by loans in Gallia.

4) Recall the lesson of the Kydland-Prescott model of "time-inconsistent" monetary policy: in rational expectations equilibrium, inflation will exceed society's desired inflation rate, if the central bank's policy expresses society's desire for output greater than the natural rate of output. *Prove* this result using appropriate equations. For simplicity, assume that the central bank can directly control the current inflation rate, taking expected inflation as given. *Look at notes.*

5) Consider an economy with an expectations-augmented Phillips curve: $\pi_t = {}_{t-1}\pi_t^e + \alpha y_t$

and an IS curve: $y_t = -\beta r_t$ where *y* is the output gap (the difference between output and the natural rate of output) and *r* is the gap between the real interest rate and the natural rate of interest. The central bank follows an "interest-rate rule" $r_t = \gamma y_t + \theta \pi_t$
Consider adding "additive disturbances" to the equations describing this economy.

Note that I told you the central bank follows an interest rate rule. It is NOT inflation targeting or acting to minimize a loss function.

a) What kind of additive disturbances, in which equation(s), would generate a positive correlation between the output gap and the real interest rate, and a positive correlation between the output gap and inflation, in rational expectations equilibrium? Illustrate this situation using *two* graphs. Both graphs have output on the horizontal axis. On the vertical axis, one graph has the real interest rate; the other has the inflation rate. *Additive disturbance to IS. This will cause IS curve to wriggle in IS/MP graph, and cause AD to wriggle in AS/AD graph (the one with inflation, not the price level on the vertical axis).*

b) What kind of additive disturbances would generate a negative correlation between the output gap and the real interest rate, and a negative correlation between the output gap and inflation, in rational expectations equilibrium? Illustrate this situation using two graphs, as above. *Additive disturbance to Phillips curve. This causes AS to wriggle in AS/AD graph, and MP to wriggle in IS/MP graph. Additive disturbance to MP won't do it, because that would correspond to wriggles in AD, not AS.*