Answer Key for Midterm
Ec 3334 - Fall 2005

1) a)

$$\begin{aligned} NGDP_{2005} &= Q_{TV}^{2005}P_{TV}^{2005} + Q_{Dorito}^{2005}P_{Dorito}^{2005} \\ &= 10(\$1000) + 1000(\$1) \\ &= \$11,000 \end{aligned}$$

$$\begin{aligned} NGDP_{2006} &= Q_{TV}^{2006}P_{TV}^{2006} + Q_{Dorito}^{2006}P_{Dorito}^{2006} \\ &= 15(\$800) + 1500(\$2) \\ &= \$15,000 \end{aligned}$$

b)

$$\begin{aligned} RGDP_{2005} &= Q_{TV}^{2005}P_{TV}^{2005} + Q_{Dorito}^{2005}P_{Dorito}^{2005} \\ &= 10(\$1000) + 1000(\$1) \\ &= \$11,000 \end{aligned}$$

$$\begin{aligned} RGDP_{2006} &= Q_{TV}^{2006}P_{TV}^{2005} + Q_{Dorito}^{2006}P_{Dorito}^{2005} \\ &= 15(\$1000) + 1500(\$1) \\ &= \$16,500 \end{aligned}$$

c)

$$\begin{aligned} Deflator_{2005} &= \frac{NGDP_{2005}}{RGDP_{2005}} \times 100 = \frac{\$11,000}{\$11,000} \times 100 = 100 \\ Deflator_{2006} &= \frac{NGDP_{2006}}{RGDP_{2006}} \times 100 = \frac{\$15,000}{\$16,500} \times 100 = 90.9 \end{aligned}$$

According to the deflator prices are falling

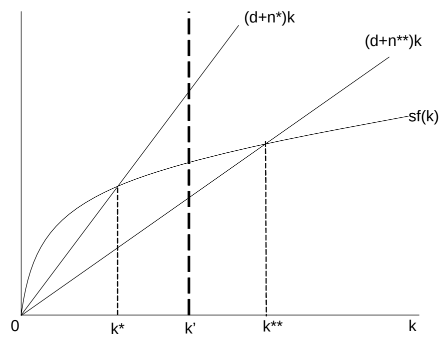
d)

$$\begin{aligned} CPI_{2005} &= \frac{Q_{TV}^{Basket}P_{TV}^{2005} + Q_{Dorito}^{Basket}P_{Dorito}^{2005}}{Q_{TV}^{Basket}P_{TV}^{2005} + Q_{Dorito}^{Basket}P_{Dorito}^{2005}} \times 100 \\ &= \frac{2\,(\$1000) + 2000(\$1)}{2\,(\$1000) + 2000(\$1)} \times 100 \\ &= 100 \end{aligned}$$

$$\begin{aligned} CPI_{2006} &= \frac{Q_{TV}^{Basket}P_{TV}^{2006} + Q_{Dorito}^{Basket}P_{Dorito}^{2006}}{Q_{TV}^{Basket}P_{TV}^{2005} + Q_{Dorito}^{Basket}P_{Dorito}^{2005}} \times 100 \\ &= \frac{2\,(\$800) + 2000(\$2)}{2\,(\$1000) + 2000(\$1)} \times 100 \\ &= 140 \end{aligned}$$

According to the CPI prices are rising. This is because the basket of goods (2 TV's and 2000 Doritos) is heavily weighted towards the item that has an increasing price and the CPI doesn't take into account the fact that people were substituting away from Doritos and towards plasma TV's.

2. a), b), c)

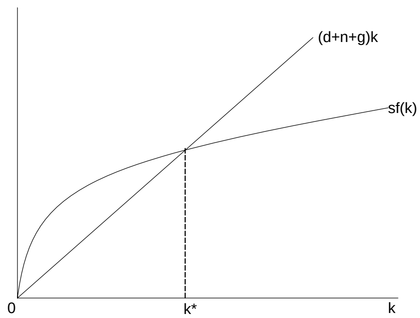


At the growth rate of population n*, there is a steady state level of k*. With a lower population growth rate of n**, there is a higher steady state value of k**. Now, in between k* and k** I've drawn a value of k'. Below k', the population growth rate is n*, above k' the population growth rate is n**.

d) If k starts very close to zero, what happens? Well, savings are higher than depreciation $sf(k) > (\delta + n^*) k$ so k starts to rise. It rises up to k^*, which is a steady state. So if the economy starts with a really low value of k, it will end up at the lower, poorer steady state with high population growth rates. No, the economy will not ever jump to k^{**} unless something happens like in part e)

e) A shock raises k in the economy to larger than k'. (Maybe the aliens give us some free capital). Now, at $k > k'$ the economy has the lower population growth rate of n**. So now the steady state the economy moves to is the k^{**} one.

3. a)



b) In the steady state output per person grows at the rate g.

c). What is k?

$$k = \frac{K}{EL}$$

so if E goes up, k must fall.

d) No, the steady state value of k does not change because E went up. Why? Because the steady state value of k is determined by the savings rate (s), the depreciation rate δ, the population growth rate n and the tech growth rate g, as well as the shape of the f function. E doesn't determine the steady state.

e) Income per person immediately goes up because of E increasing. How? Think about what the production function looks like

$$Y = F(K, EL)$$

which in per person terms can be written as

$$\frac{Y}{L} = F\left(\frac{K}{L}, E\right)$$

Since K and L didn't change, any increase in E must mean that income per person went up.

f) What is the growth rate of output per person?

$$\begin{aligned} \%\Delta Y/L &= \%\Delta y + \%\Delta E \\ &= \%\Delta y + g \end{aligned}$$

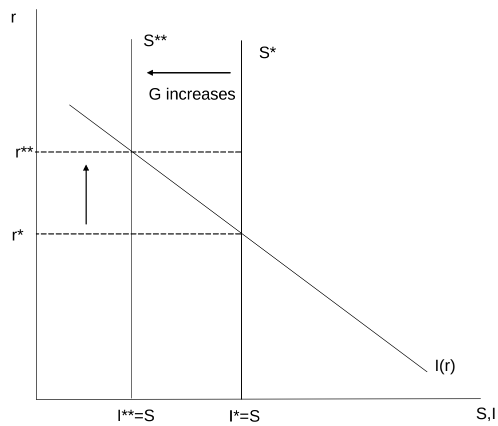
In steady state $\%\Delta y = 0$. But now the increase in E means that we are not at the steady state. Now k is below k^* so k is growing, and if k is growing then so is y. Therefore $\%\Delta y > 0$. So the growth rate of output per person is

$$\begin{aligned} \%\Delta Y/L &= \%\Delta y + g \\ &= \text{(some positive number)} + g \end{aligned}$$

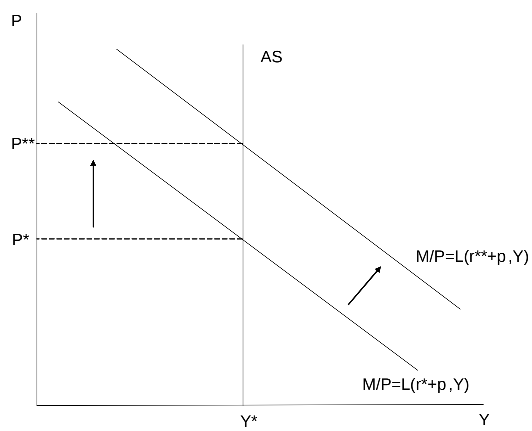
So outptut per person is growing at a rate greater than g.

g) Once the economy reaches the steady state it again grows at rate g because in the steady state $\%\Delta y = 0$

4. a)



b)



c) Increased government spending means that total savings decreases, which raises the interest rate to r**.

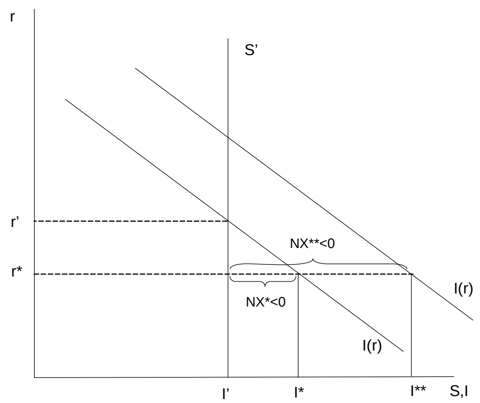
d) This increase in r** means that nominal interest rates rise, and so therefore the AD curve shifts up and prices rise to P**.

e) If the Fed wanted to offset the price increase what would they do? They would have to *lower* the money supply M, in order to shift the AD curve back to the left, and reduce the price level.

f) Back in 1992, if you knew that Medicare would lead to big price increases, your expected inflation rate would have increased. In 1992 then, the nominal interest rate would have increased, while the real interest rate would have remained the same (because G hadn't shifted yet). Also in

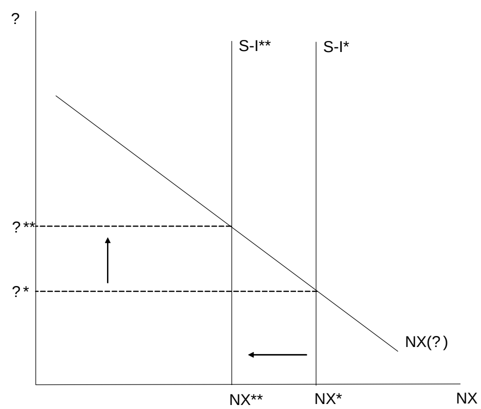
1992, the increase in nominal interest rates because of higher expected inflation would have moved out the AD curve and prices would have risen to P** already in 1992.

5. a) If the US were close, equilibrium would be r' and I' in the diagram.



b) With a world interest rate of r*, the US still has savings of S', but now has investment of I*. At this interest rate I* > S', so net exports are negative, or NX*<0.

c) The diagram shows how the equilibrium real exchange rate of ϵ^* is determined



d) An increase in investment demand shifts the I(r) curve out. At the world interest rate, this means more investment, and since savings is constant, then the net exports become even smaller (more negative) or the trade balance gets even worse.

e) In the real exchange rate diagram this shows up as a shift in S-I to the left, raising the equilibrium real exchange rate to ϵ^{**}.

f) The nominal exchange rate is

$$e = \epsilon \frac{P^*}{P}$$

where P is the US price level and P^* is the world price level. We know that ϵ went up because of the change in investment demand, but I told you that e stayed the same. So it must be the case that P went up relative to P^* for this to happen. In other words the price level in the U.S. must have increased faster than prices in the rest of the world, and this kept the nominal exchange rate from going up even though the real exchange rate went up.