

Suggested Solution to Assignment 3

1.

	Growth	GDP per cap. (now)	GDP per cap in 50 years
Slowenia	1%	5,000	8,223.16
Speedia	3%	5,000	21,919.53
Wealthica	1%	10,000	16,446.32

2.

a) $(2K_A^{0.3})(2L_A^{0.7}) = 2(K_A^{0.3})(L_A^{0.7}) = 2Y_A$

$(2K_B^{0.3})(2L_B^{0.8}) = 2^{1.1}(K_A^{0.3})(L_A^{0.8}) = 2^{1.1}Y_B$. Note that the output for country B is increased higher than country A.

b) With the same algebra, we get $\frac{1}{2}Y_A$, and $(\frac{1}{2})^{1.1}Y_B$. In contrast to 2a), country A has higher proportion of output left than country B.

c) $y_A = k_A^{0.3}$ and $y_B = k_B^{0.3}L_B^{0.1}$. Production function for country B cannot be transformed into per capita form.

d) For country A, $s_A = 0.4$, $\delta_A = 0.1$, $n_A = 0.02$

At steady-state $0.4k_A^{*0.3} = 0.12k_A^* \Rightarrow k_A^* = \left(\frac{0.4}{0.12}\right)^{\frac{10}{7}} = \left(\frac{10}{3}\right)^{\frac{10}{7}}$.

So that output is $y_A^* = \left(\left(\frac{10}{3}\right)^{\frac{10}{7}}\right)^{0.3} = \left(\frac{10}{3}\right)^{\frac{3}{7}}$.

Consumption is $c_A^* = (1-s)y_A^* = 0.6\left(\frac{10}{3}\right)^{\frac{3}{7}}$.

e) To find Golden-rule k, or k_{GR}^* we first set consumption function as a function of k: $c^* = y^* - i^*$ where i^* = break-even investment (Remember that Golden rule is always in steady state where actual and break-even investments are equal)

$$c = k^{0.3} - (0.1 + 0.02)k = k^{0.3} - 0.12k$$

$$\frac{dc}{dk} = 0.3k^{-0.7} - 0.12 = 0$$

$$k_{GR}^* = \left(\frac{5}{2}\right)^{\frac{10}{7}} \approx 3.7$$

To find saving rate that would yield such k_{GR}^* , we equate actual and breakeven investments: $sf(k_{GR}^*) = (\delta + n)k_{GR}^*$, then substitute the value of our k_{GR}^* :

$$s(k_{GR}^*)^{0.3} = 0.12k_{GR}^*$$

$$s\left(\frac{5}{2}\right)^{\frac{10 \cdot 3}{7 \cdot 10}} = 0.12\left(\frac{5}{2}\right)^{\frac{10}{7}}$$

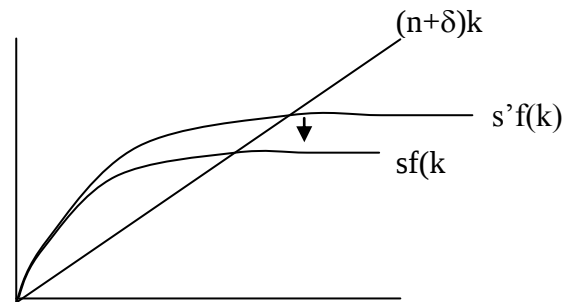
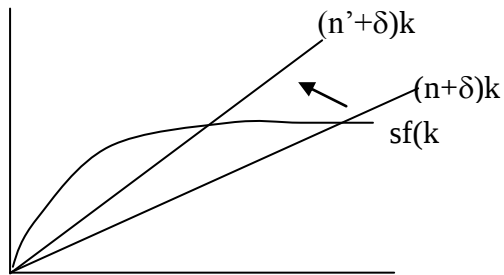
$$s = 0.12\left(\frac{5}{2}\right)^{\frac{10 \cdot 3}{7 \cdot 7}} = 0.12\left(\frac{5}{2}\right) = 0.3$$

This economy needs to adjust saving rate to 0.3 in order to achieve Golden rule.

3. a) Nothing as Steady State has not changed.

b) increase in n leads to falling in c^*

c) Increase in energy price = adverse supply shock) $\rightarrow c^* \downarrow$



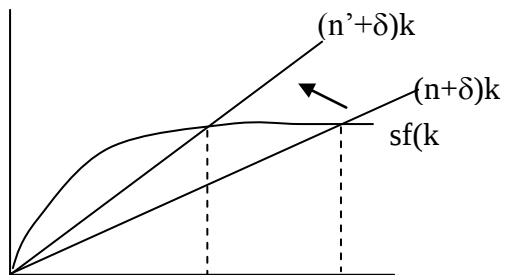
d) Temporary rise in saving rate leads to no change in c^* as there is no change in SS.

e) Nothing as Steady State has not changed.

4. Increase in depreciation rate

a) Solow

$k^* \downarrow, y^* \downarrow, c^* \downarrow, \Delta K/K \text{ unchanged} = n+g$
in the long run



b) $\frac{\Delta K}{K} = sA - \delta \downarrow$ because δ has increased, so that $\frac{\Delta K}{K} \downarrow, \frac{\Delta Y}{Y} \downarrow, \frac{\Delta C}{C} \downarrow$