Quiz 3 - Answers

Question 1
Which of the following are recommended to foster sustained growth?

A. Encouraging education
B. Encouraging R&D investments
C. Encouraging private savings
D. Encouraging consumption of domestic goods
E. A, B, C and D
F. A, B and C only
G. A, B and D only
H. A, C and D only
I. A and C only

Discuss catch-up growth vs. sustained growth (handout 4, page 20). The question aims at discussing why accumulation of physical or human capital is bounded and cannot provide sustained growth, while technology growth (being exponential) can lead to sustained growth (textbook, section 7.2).

Question 2
China's economy is one of the fastest-growing economies in the world. Growth in China is primarily driven by investment and exports. You are discussing the sustainability of China's growth model with your friend. He says that according to the aggregate production function, China needs to continue to increase its physical capital stock to ensure sustainable growth.
Do you agree?

A. No, because you also need to increase the amount of human capital along with physical capital.
B. No, because diminishing marginal product of capital means that growth will not be sustained.
C. Maybe, but only if the saving rate and therefore the rate of investment also increase.
D. Yes, because increasing the physical capital in an economy allows increased production.

Question 3
What did Malthus predict about economic growth?

A. There would be a demographic transition as the economy moved from agriculture to industry.
B. Rural areas would continue to go through a Malthusian cycle of fertility adjustment while urban areas would not.
C. The number of children per family would adjust so that income would remain close to a subsistence level.
D. As income increased, the number of children per family would decrease so that income would remain close to a subsistence level.

This question aims at highlighting the mechanics of Malthus's model: when income per capita grows bigger, fertility would increase and health conditions would lead to larger population; when income per capita falls, fertility follows and poor health and wars would adjust the population level.

Question 4
Did Malthus's predictions come true?
A. Yes, even though average GDP per capita increased over time, the distribution of income has become more unequal.
B. Yes, because as the world population has grown, so has poverty.
C. No, because his prediction failed to account for migration.
D. No, because he failed to account for the demographic transition and the impact of the Industrial Revolution.

Malthus's predictions were based on a context of stagnant GDP with no technological growth and positive correlation between income and fertility. The industrial revolution and the demographic transition changed that.
See Handout 5, slides 6, 7 .

Question 5
How does capital accumulate in the productive process according to Solow?
A. Through technologies that make it more easily reproducible.
B. Through households' savings
C. Through better education of the population
D. Through better work ethics

Investment equals savings in the Solow model with a closed economy. Handout 5, slide 12.

Question 6
The state of Ellessee is a closed economy and is constantly saving 40% of its output and its capital is constantly depreciating at a 30% rate. The stock of capital last year was equal to $1,000. What will happen to output this year?

A. It will increase
B. It will decrease
C. We cannot tell

We cannot tell, as we don't know if sY>dK, i.e. if 0.4*Y>0.3*$1,000=300. So, if Y>750, output will grow. The purpose of the question is to practice thinking about growth in the Solow model.
From handout 5, slide 11:

$$K_{now}-K_{last\ year} = I - d \times K_{last\ year}$$
$$= s \times Y_{last\ year} - d \times K_{last\ year}.$$

Question 7

As above, the state of Ellessee is constantly saving 40% of its output and its capital is constantly depreciating at a 30% rate. The stock of capital on 1 January 2015 was $1,000 and output produced in 2015 was equal to $2,000. How much is the stock of capital worth on 1 January 2016?

A. $1,400
B. $1,500
C. $1,800
D. $2,000

K_{now}=$1,000 + 0.4 x $2,000 – 0.3 x $1,000
The purpose of this question is to go through the Solow model

Question 8
Why does output growth slow down in the Solow model?

A. Because capital depreciates at a faster rate
B. Because the amount saved becomes less productive
C. Because the amount saved increases at a slower rate
D. Because of diminishing marginal product of capital
E. A, B and C only
F. A, B and D only
G. A, B, C and D
H. B, C and D only

Diminishing marginal product of capital implies that each additional unit invested is less productive, so savings

increase less and less until they are overtaken by capital depreciation.
Amount saved is the product of saving rate times output (sY). Because there is diminishing MPK, output Y itself is increasing at a slower rate (recall the properties of aggregate production function), thus the product sY is increasing at a slower rate for any fixed saving rate s.

Now if sY is increasing at a slower rate then growth must slow down according to the capital accumulation equation.

This question aims to go through the graphical representation of the model and realise that growth slow down because of the difference between investment and depreciation

Question 9

How is the steady state level of output defined in the Solow model?

A. aggregate investment = aggregate depreciation
B. Marginal product of capital = 0
C. saving rate = consumption rate
D. saving rate = depreciation rate

This question shows how to determine the steady state. See handout 5 slide 14.

Question 10
Which of the following might affect the steady state level of output in the Solow model?

A. An earthquake that destroys available machinery
B. A change in people's preferences for consumption
C. Foreign aid
D. Capital depreciating at a higher rate
E. A, B and C only
F. A, B, C and D
G. A and C only
H. A and D only
I. B and D only

A and C only affect transition to steady state, not its level. B and D, contrarily, affect the steady state condition. Show graphically.

Question 11

A country only cares about increasing its steady state level of consumption. To do so, it is forcing its citizens to save a fraction S of their income. Its government is considering raising S by one percentage point every year. Why is this not a good strategy?

A. Because at some point S will hit an upper bound.
B. Because when S is too high capital depreciates more.
C. Because of the limitations of the Solow model.
D. Because consumption will decrease at some point.
E. A, B and C only
F. A, B, C and D
G. A and C only
H. A and D only
I. B and D only

See handout 5, slide 24, for relation between saving and consumption. Think about the two extreme cases (S=0, S=1). Also, saving has an upper bound of 100%.