Midterm Exam (Open-Book)
Intermediate Macroeconomics
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Name: _____ **Student ID:**_____

1. ($10' + 8' \times 6 + 10' = 68$ points) Consider a closed economy, the *Yujia Mountain*, that produces and consumes only apples and oranges. In year 2016, it produced 200 apples and 400 oranges, and the prices for apples and oranges were ¥2 and ¥2, respectively. In year 2017, the economy consumes 150 apples and 200 oranges, and the prices become ¥3/*apple* and ¥4/*orange*. What is more, the economy has adopted a warehouse to offset the shocks caused by unexpected natural disasters such as earthquakes and floods. At the end of 2016, there were 100 apples and 100 oranges kept in the warehouse. The numbers, however, jump to 200 apples and 150 oranges at the end of 2017.

(a) Take 2016 as the base year, calculate the nominal GDP, real GDP, and GDP deflator of *Yujia Mountain* in 2017.

(b) It is said that a representative household of *Yujia Mountain* is used to consuming 3 apples and 4 oranges as a fixed combo（套餐）. Calculate its CPI

in 2017 with year 2016 treated as the base year.

(c) Is the price level decreased or increased from 2016 to 2017? According to the Quantity Theory of Money, what determines this change?

(d) Suppose the economy uses two inputs, labor and land, to produce outputs. And a sudden shock, e.g., an earthquake, destroys a significant portion of land. How does the shock affect the rental price of land in *Yujia Mountain*? Provide your answers both graphically and with economic explanations.

(e) In year 2017, The population of Yujia Mountain is 100, and there are 81 persons employed. It is also known that its unemployment rate is 10%. How

many persons are not entering the labor force in 2017?

(f) It is said that planting apples and planting oranges require totally different skills. Suddenly, a *structural change* happens: The economy dislikes apples and favors oranges. As a result, Kathy, a worker who has been trained to plant apples, becomes unemployed. It takes a whole year for Kathy to become a qualified orange planter and get employed again. Should Kathy's unemployment be categorized as frictional unemployment or structural unemployment? Explain your answers.

(g) Some workers planting oranges united together and established a union named "*Frictional Power*", which successfully raised the wage of orange planters who are members of the union. As a result, the firms are hiring less workers, and Bob, a qualified orange planter, is out of a job, even if he is more than happy to accept a wage level that is much lower than the prevailing one. Should Bob's unemployment be categorized as frictional unemployment or structural unemployment? Explain your answers.

(h) Suppose *Yujia Mountain* has entered the international market and become a small open economy in the world. Given its endowments（禀赋), the economy possesses comparative advantage in producing oranges. As a result, it exports oranges and imports apples. Realizing that, other things equal, higher net exports lead to higher GDP, the authority of the economy launched a worldwide "Beautiful Yujia" promotion which aimed to make its exports more favored by foreigners. Suppose the promotion is successful and costs nothing. Will this policy raise the economy' net exports? Provide your answers both graphically and with economic explanations.

2. ($8' \times 4 = 32$ points) Consider a growth model with a Cobb-Douglas production function:

$$Y = F(K, EL) = K^{\frac{1}{2}}(EL)^{\frac{1}{2}},$$

where labor grows at rate n, technology progresses at rate g, and capital depreciates at rate δ.

(a) Given $k = \frac{K}{EL}$, write out the expression for $f(k)$. What is the relationship between $\frac{\partial Y}{\partial K}$ and $f'(k)$? Point out which important property embedded in the production function leads to this relationship.

(b) Suppose in the unique steady state, we have $k^* = 100$, $\alpha = 0.5$, $n = 0.01$, $g = 0.05$, $\delta = 0.03$. Then $MPK \lessgtr n + g + \delta$?

(c) Based on your answers in the question above, what is your policy suggestion, if any, for the government to make the households better off? Explain your answers.

(d) It is said that along the balanced growth path, the personal income $\frac{Y}{L}$ and personal technology $\frac{E}{L}$ grow at the same rate. True or False? Explain your answers.