I. Microeconomics

1. Suppose that firm DH produces only one output \( y \) and is the only firm in the market. There are two factors \( (x_1, x_2) \) needed for its product and the market prices are \( (w_1, w_2) \), respectively. The production function for the firm is \( f(x_1, x_2) = \min\{x_1, x_2\} \).
   (a) What kind of return to scales for the production function firm DH has? (5%)
   (b) Please find the minimal cost function \( c(w_1, w_2, y) \), Assume knowing \( w_1 = 40 \). (5%)
   (c) Given the market demand is \( y = 100 - p \). What is the profit function respect to the price of \( x_2 \) (that is \( w_2 \))? (5%)
   (d) Now if \( w_2 = 40 \), how many outputs will the firm DH decide to produce? How about if \( w_2 = 70 \), how many outputs will the firm DH decide to produce? (5%)
   (e) Now if the price of \( x_2 \) is unknown. But the firm wants to have at least 10% rate of return when output \( y = 34 \). What will the maximum price the firm DH should pay for factor \( x_2 \)? (5%)

2. City A is going to build 700 parking spaces in its Central Business District. The total cost for this project is 10,000 dollar. Suppose that the demand function of the parking space is \( P = 100 - 0.1X \) where \( P \) is the parking fee and \( X \) is the units of parking space.
   (a) If the City government's goal of this project is to maximize the total parking revenue, then what price should City government charge? How much the revenue will be? (10%)
   (b) If the government's goal for this project is to maximize the social welfare, then what price should City government charge? How much the social welfare will be? (10%)
   (c) If the mayor is going to set the parking fee zero, from an economic perspective, will you agree his/her price policy? Why? (5%)
II. Macroeconomics:

1. Following the neoclassical growth model, suppose that an ideal economy is characterized by the following production function, \( Y = 5K^{0.5}L^{0.5} \), where \( Y \), \( K \) and \( L \) are total output, capital stock and labor force, respectively. The saving rate is 0.2, the population growth rate is 0.01 and the depreciation rate is 0.09. What is the capital-labor ratio in the steady state? What is the per capita output in steady state? What is the steady-state value of consumption per worker? Does this steady state satisfy the golden rule of capital accumulation? Why? Or why not? (25%)

2. Assume that a hypothetical country produces only three goods, apple, banana and orange. Information regarding output and prices is given below: (25%)

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th></th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quantities</td>
<td>Prices</td>
<td>Quantities</td>
</tr>
<tr>
<td>Apple</td>
<td>20</td>
<td>$1.0</td>
<td>40</td>
</tr>
<tr>
<td>Banana</td>
<td>60</td>
<td>$0.5</td>
<td>40</td>
</tr>
<tr>
<td>Orange</td>
<td>30</td>
<td>$0.75</td>
<td>100</td>
</tr>
</tbody>
</table>

Please find the following indices of year 2 by assuming year 1 as the base year:
(a) the real GDP index at fixed year 1 prices;
(b) the real GDP index at fixed year 2 prices;
(c) the chain-weighted real GDP index;
(d) the GDP deflator at fixed year 1 quantities;
(e) the GDP deflator at fixed year 2 quantities;
(f) the chain-weighted GDP deflator;
(g) the nominal GDP index and
(h) the implicit GDP deflator.