1. Consider the case of a forester who must decide when to cut down a growing tree. Assuming that the value of the tree at any time, t, is given by $f(t)$ and that L dollars were invested initially as payments to workers who planted the tree. Assume also the continuous market interest rate is given by r. Suppose the trees grow according to the equation: $f(t) = e^{0.6\sqrt{t}}$, where e is the base of natural logarithms.

    (1) Please show the present discounted value (PDV) of the treeowner's profit when the tree is planted. (10%)

    (2) If the real interest rate is 0.05, please find the optimal harvesting age. (5%)

    (3) If the real interest rate rises to 0.06, again find the optimal harvesting age. (5%)

    (4) If we consider both answers from (2) and (3), what is your explanation ? (5%)

2. Consider a duopoly where the demand and cost functions are : $p = 100 - 2(q_1 + q_2), c_1 = 2q_1 \text{ and } c_2 = 2q_2^2$
   Assume that each firm maximizes his profit on the assumption that the quantity produced by his rival is invariant with respect to his own quantity decision.

    (1) derive each firm's quantity reaction function. (10%)

    (2) determine equilibrium values of price, quantity and profit for each firm. (15%)

3. Please graphically analyze the impact of expansionary monetary policy on the equilibrium interest rate, exchange rate, general price level, net export and GOP of the economy under:

    (1) flexible exchange rate regime. (10%)

    (2) fixed exchange rate regime. (10%)

4. A current long-threatened trade war between the US and China has got under way after these two worlds' largest economies imposed tariffs on each other. We know so far the trade war between them continues.

    (1) Suppose both U.S. and China have two trade strategies to follow: free trade or protection, e.g., imposing tariff on the products of the other country. Suppose also that the net payoffs of the combinations of the strategies of both U.S. and China are summarized in the following table:

Unit: Million U.S. Dollar

China \ U.S.	Free Trade	Protection (imposing tariff)
Free Trade	200 / 200	400 / -250
Protection (imposing tariff)	-250 / 400	-150 / -150

   If both U.S. and China act individually, what is the best trade strategy for each country? Please analyze the best strategy for each country according to the above table. (10%)

    (2) If both U.S. and China could cooperate with formulating their respective trade strategies, what is the best trade strategy for each country? Please analyze the best strategy for each country according to the above table. What are possible ways for both U.S. and China to cooperate with formulating their respective trade strategies? (15%)

    (3) In reality, what kind of the current resolution do both U.S. and China adopt to mitigate the negative impact of trade war? (5%)