

**ECON 300**  
**Advanced Macroeconomics**  
Dr. Yetkiner

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**Midterm Exam**

1. (10 Points) Calculate the GDP of Farmland, a fictitious economy whose numbers are listed below. Do so using all three methods (value added approach (3 points), expenditure approach (3 points), and income approach (4 points)).

**FarmLand, Year 2014**

**Farmer Jones, (private firm)**

Corn sold to Singapore	\$30
Corn sold to FoodCo, Inc	\$20
Paid workers	\$40
Pesticide bought from Turkey	\$10

**FoodCo, Inc (private firm)**

Corn Flakes Sold to Consumers	\$100
Corn Flakes Sold to Japan	\$10
Corn bought from Farmer Jones	\$20
<b><u>Corn Inventory</u></b>	
Beginning of Year	\$20
End of Year	\$25
Paid workers	\$20

**Farmland Govt**

Tax Revenue	\$25
Wage payments for defense	\$25

**Households**

Taxes on wage income	\$25
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2. (30 Points- Work-Leisure tradeoff--PARTIAL EQUILIBRIUM) Suppose that utility function  $u$  of a representative agent is  $u = c^{0.75}l^{0.25}$ , where  $c$  is consumption of physical goods and  $l$  is consumption of leisure. Suppose that real wage rate is  $\bar{w} = 3$ ,  $\bar{h} = 24$ , and profit income is  $\bar{\pi} = 24$  and that there is no government in the economy.

- (a) (5 points) **Illustrate** the representative consumer's optimization problem. **Hint:** The given information allows you to draw a budget constraint. Indifference curve map would be hypothetical.
- (b) (10 points) **Find** optimal values of  $c$  and  $l$ . **Hint:** Assume an interior solution.
- (c) (5 points) Suppose now that profit is **reduced to**  $\bar{\pi} = 12$ . What effect is this? **Illustrate** the effect and **find** optimal values of  $c$  and  $l$ . **Hint:** Assume an interior solution.
- (d) (10 points) Go back to original data. Suppose now that wage rate is **increased to**  $\bar{w} = 4$ . **Illustrate** the effect and **find** optimal values of  $c$  and  $l$ . Which effects do you think work out? Are your results fit with your expectation of 'under normal conditions'? **Hint:** Assume an interior solution.



**3. (25 Points- Work-Leisure tradeoff-- GENERAL EQUILIBRIUM)** Suppose that utility function  $u$  of a representative agent is  $u = c^{0.20}l^{0.80}$ , where  $c$  is consumption of physical goods and  $l$  is consumption of leisure. Suppose also that production technology is represented by  $y = (0.5)\bar{K}^{0.5} \cdot N^{0.5}$  where  $\bar{K} = 4$  is the physical capital stock and  $N$  is labor. We assume that  $\bar{h} = 24$ ,  $\bar{h} = l + N$  and that there is no government in the economy. Whenever required, use  $w$  and  $\pi$  to denote the real wage and real profits, respectively. Find the optimal values of  $c$ ,  $l$ ,  $N$ ,  $y$ ,  $w$ ,  $\pi$ , and  $u$  under the competitive equilibrium assumption.



**4. (25 Points--Two-Period/consumption-saving tradeoff-PARTIAL EQUILIBRIUM)**

Suppose that Ahmet has income of  $Y_1 = 800$  when he is young and  $Y_2 = 997.5$  when he is old. The real interest rate is  $r = 0.05$ , elasticity of marginal utility  $\theta = 0.5$  and that the overall utility function of Ahmet is  $U = \frac{C_1^{1-\theta}}{1-\theta} + \left(\frac{1}{1.05}\right) \frac{C_2^{1-\theta}}{1-\theta}$  (the subjective rate of discount is  $\rho = 0.05$ ).

- (i) **(15 points)** Find the optimal values of  $C_1$ ,  $C_2$  and  $s$ . Is this representative agent borrower or a lender?
- (ii) **(10 points)** Suppose now that current income increases to  $Y_1 = 1200$ . Find the new optimal values of  $C_1$ ,  $C_2$  and  $s$ . **Interpret your results.**



5. (15 Points) Using the *partial equilibrium* model of **TWO-PERIOD/ CONSUMPTION-SAVING** tradeoff model, determine the effects of a **decrease in real interest rate** on *current consumption*, *future consumption* and *the saving* for a **BORROWER** through using graphical tools. **Hint:** Do not forget to draw a figure and discuss in detail the impact of the exogenous shock.