Homework Questions

1) El Niño wind patterns affected the weather across the United States during the winter of 1997–1998. Suppose the demand for home heating oil in Connecticut is given by $Q = 20 - 2P_{hho} + 0.5P_{ng} - TEMP$, where Q is the quantity of home heating oil demanded, P_{hho} is the price of home heating oil per unit, P_{ng} is the price of natural gas per unit, and TEMP is the absolute difference between the average winter temperature over the past 10 years and the current average winter temperature. If the current price of home heating oil is $1.20, the current price of natural gas is $2.00, and the average winter temperature this year is 40 degrees compared to 28 degrees over the past 10 years.

        A. What is the quantity of home heating oil demanded? How much did change in winter temperature effect demand in comparison to the average winter temperature?
        B. What is the estimated price elasticity of demand for home heating oil?
        C. If the sellers of home heating oil are profit maximizers, how should price be adjusted?

2) The accompanying table describes Ben's preferences over cake and ice cream. The utility from consumption of one good is independent of the consumption of the other. The price of cake is $10 per unit, and the price of ice cream is $4 per unit. MU stands for Marginal Utility

Units Consumed	MU Cake	MU Ice Cream
1	80	20
2	60	19
3	40	18
4	20	17
5	15	16

        a. If Ben has $50 to spend, the optimal combination of these goods is?
        b. Ben's total utility at this optimal consumption bundle will be?
        c. Now suppose Ben has $70 to spend. How do the answers to question a & b above change?

3.) A regression of exports as a function of imports in 1991 across industry types yielded exports $= 68 - 0.3$(imports), $R^2 = .25$, Prob $> F = .26$, F-critical $= 2.91$

        a. If imports by an industry equal 60, what is the estimate of exports from this industry? How confident are you of your estimate? Explain. .
        b. How much of the variation is explained by the regression?

4) According to data obtained by the U.S. Department of Agriculture, the relationship between a cow's total output of milk and the amount of grain it is fed is as follows:

Amount of Grain (Pounds)	Amount of Milk (Pounds)
1,200	5,917
1,800	7,250
2,400	8,379
3,000	9,371

(This relationship assumes that forage input is fixed at 6,500 pounds of hay.)

a. Calculate the average product of grain when each amount is used.
b. Estimate the marginal product of grain when between 1,200 and 1,800 pounds are fed, when between 1,800 and 2,400 pounds are fed, and when between 2,400 and 3,000 pounds are fed.
c. Does this production function exhibit diminishing marginal returns?