Wilf Csaplar Jr.   Business 205   Homework #9   **Due Friday 11/16**

Place your name on the back of this sheet of paper and nowhere else. Staple your answers face up on the front of this sheet of paper. Failure to follow these directions will cost you 1 point. If you use double-sided printing or print on the back of scrap paper, I will give you one additional point.

Show all work.

1) Suppose a production function is given as $f(K, L, T) = 16K^{1/4}L^{1/2}T^{1/4}$ where K is the amount of capital, L is the amount of labor, and T is the amount of land. (This is a common way to include land and I assume it comes from the Latin word terra, the French word terre, or the Spanish tierra.)
A) (8 points) Find ∇f
B) (8 points) Find $\nabla_2 f$
C) (6 points) Find the MRTS of capital for labor, MRTS of labor for capital, and MRTS of land for labor.
D) (8 points) Prove you have decreasing MPK, MPL, and MPT.

2) Suppose a consumption function is given as $f(A, B, C) = 144A^{1/4}B^{1/3}C^{1/6}$ where A is the amount of apples consumed, B is the amount of bananas consumed, and C is the amount of cherries consumed.
A) (8 points) Find ∇f
B) (8 points) Find $\nabla_2 f$
C) (6 points) Find the MRS_{BC} at the point (256, 125, 64). What does that tell you about your willingness to trade cherries and bananas? In other words, state, "I would be will to trade ... for ..." and then explain why you said that.
D) (6 points) Given the cross partial derivatives, would you say that adding apples increases, decreases, or does not affect your marginal utility of bananas? Explain your logic.

3) Suppose a consumption function is given as $f(A, B) = 16A^{1/4} + 81B^{1/3}$ where A is the amount of apples consumed, and B is the amount of bananas consumed.
A) (6 points) Find ∇f
B) (6 points) Find $\nabla_2 f$
C) (4 points) Given the cross partial derivatives, would you say that adding apples increases, decreases, or does not affect your marginal utility of bananas? Explain your logic.

4) (10 points) Given your answers to 2D and 3C, which type of function do you think would make a better production function, an additively separate production function or a Cobb-Douglas production function? Explain your logic. (I realize Questions 2 & 3 are consumption functions, but you can generalize them to production functions because the two are virtually identical.)

5) (16 points) How can we use the Implicit Function Theorem to find the slope of an indifference curve? Use $U(A, B) = f(A, B)$ in your example assuming that A is on the X-axis.