CHAPTER 2.

1. Define the term, “production function.”

2. Write a mathematical relationship for wheat production. Define all variables.

3. Suppose that a veterinary researcher would like to understand the impact of growth hormones on horse health. Describe using math and words how the researcher would set up this experiment.

4. Explain how we would know if a wheat farm in North Dakota is in the short run or the long run.

5. How many years will it take for a beef producer to be in the long run? Explain.

6. Suppose that the production function for wheat is characterized by the following data:

X =labor (hours)	Y=wheat (bil bu)
0	0
1	10
2	40
3	81
4	112
5	120
6	120
7	105

A. Define the term, “production function” and explain the usefulness of studying production.
B. Define and explain the terms, TPP, APP, and MPP.
C. Complete a chart that includes TPP, APP, and MPP.
D. Complete a graph of TPP, APP, and MPP.

7. Suppose that the input (X) wheat (bu), is ground into output (Y) flour (lbs) at a flour mill. Use the data for X and Y to calculate TPP, APP, and MPP in the chart below. Write the units for X, Y, TPP, APP, and MPP below.

X	Y
0	0
1	100
2	400
3	600
4	640
5	600

8. Graph TPP, APP, and MPP. Be sure to include labels and units.

9. Identify the three stages of production in the graph above.

10. State and explain the relationship between average and marginal productivity.

11. Identify the point on the TPP graph where diminishing returns begin.

12. Define the Law of Diminishing Returns, and explain the real world implications.

13. Define and explain the term, "*ceteris paribus*." Science is also called, "reductionism." Explain what this means. Given the complexity of the real world, doesn't economics make too many assumptions to be useful? Carefully explain why or why not.

14. Use McDonalds as an example to define and explain the terms, "immediate run," "short run," and "long run."

15. Write an essay and use a graph to define and explain the three stages of production. Use a real-world example from your own life to demonstrate how these stages can be used to help us understand the human condition.

16. Write an essay and use a graph to define and explain technological change. Find a real-world example of technological change from the history of food and agriculture. Write an essay on the role of technological change on the history of humankind. How important will technological change be in the future? Carefully explain your examples and positions.

17. Suppose that nitrogen (lbs) is used to produce corn (bu) on a farm. The price of nitrogen is P_X=\$4/lb, and the price of corn is P_Y=\$2/bu. Use the data for X and Y to complete the table below, including units.

X	Y	TPP	APP	MPP	TRP	TFC	Π	MRP	MFC
0	0								
1	5								
2	20								
3	45								
4	60								
5	70								
6	72								
7	63								

18. Graph TPP, APP, and MPP from question 17. Be sure to include labels and units.