Week #5 (February 5 and 7, TEST on 9th!!) Text: pages 261-270, and 152-159. Notice the last section of reading is from Chapter 3, it is an appendix.

Study Questions/Exercises/Tips:

1. The pages in Chapter 5 are relatively few but they are important, this is the Thunen Model. Be sure you have the handout from class containing the corrections for page 265 or I've also put it at the end of this file. Understanding what these errors are is a good review of the Thunen model. Do you understand what mistakes the editor made? This is an important overlapping section of the course; that is, it overlaps with what is done in lecture.

2. Clearly Thunen was writing for an agricultural situation from the 1800's. Imagine the progression of landuses from the center of a typical American city out to the countryside. How is this model working and not working today??

3. Do you understand the difference between *Intensive* and *Extensive* agriculture? In the Thunen model?

4. Consider a situation where the crops are involved, A, B, and C. The yields and costs are given:

	A	B	C
Yield per acre (Y)	100	300	500
Price at Mkt (p)	4	6	12
On-Farm Costs (a)	1	5	9
Transport Rate (f)	0.01	0.05	0.10

Draw and discuss the resulting pattern. (Answer at the bottom of this file.)

Commentary on the fifth week readings: As mentioned above there isn't very much reading for this week. The week includes the first test so I'm expecting you will be preparing for that. The appendix on "GIS" doesn't fit well (in my opinion) with chapter 3 but I think it does fit somewhere here in the first third of the class. Consider the Thunen model and how you might employ "real world" data to the model. These data and the mathematical relationships could be put into a GIS. Several of the other topics could benefit from a GIS.

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See page 265 of Stutz & de Souza The World Economy, 1998.

There are a few errors in the section shown below.

First, the section as it appears in the book:

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LOCATION RENT: AN EXAMPLE

Location rent for any crop can be calculated by using the following formula:

$$R = E(p - a) - Efk$$

Where: errors shown highlighted

R = location rent per unit of land
E = output per unit of land
k = distance to the market
p = market price per unit of output
a = production cost per unit of land (including labor)
f = transport rate per unit of distance per unit of output

Thus, if we assume that a wheat farmer 20 kilometers from the market obtains a yield of 1,000 metric tons/km^2, has production expenses of \$50/ton/km^2 to transport grain to the market, and receives a market price of \$100/ton at the central market, the location rent accruing to 1 square kilometer of the farmer's land can be calculated as follows:

R = 1000(\$100\$50)\1000(\$120) = \$50,000\\$20,000
= \$30,000

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Should read: corrections shown highlighted.

a = production cost per unit of product (including labor)

tons/km^2, has production expenses of \$50/ton, spends \$1/ton/km to transport grain to the market, and receives a market….

R = 1000•(\$100 - \$50) - 1000 • \$1 • 20 = \$50,000 - \$20,000

Answer to question #4 above.

First work out the straight line formulae by inserting the crop specific constants into the "rent" equation:

$$R = E(p - a) - Efk = E \cdot p - E \cdot a - E \cdot f \cdot k$$

For Crop A:

R = 100x4 - 100x1 -100x0.01xk = 300 - k

For Crop B:

R = 300x6 - 300x5 - 300x0.05xk = 300 - 15k

For Crop C:

R = 500x12 - 500x9 - 500x0.10xk = 1500 - 50k

Now draw these straight lines.

Which crop can out bid the others at the market?
It is crop C which can bid $1500 per acre at the market.

Which crop will be raised furthest from the market?
It is crop A which will be raised out to 300 miles.

The tricky part (not on test) is that crop B is not raised anywhere!! Each of the others out bids B.

If you solve for k when:

300 - k = 1500 - 50k you'll get the distance where the A rent curve equals the C rent curve. This will be the distance where there is the switch from crop C to A.

50k - k = 1500 -300
49k = 1200
k = 24.49 miles out!