Week #2   Text: pages 49-82.

Study Questions/Exercises/Tips:

1. How is a *"cartogram"* different from a regular map? (pg. 50-51)

2. What's the difference between *population* and *population density* for a country or state or any geographic unit? (pg. 52) Between *urban growth* and *urbanization*? (55-56)

3. What do you think the alternative outcomes of the *Demographic Transition* might be? (59-62)

4. Consider the section *"The Economics of Migration"* (pg. 68 +) and figure 2.14 (pg. 69; hint: the figure is really two graphs, roughly mirror images). Has anyone in your family moved for employment opportunities? How do they fit into this discussion?

5. What are the axes of the graph called a *Population Pyramid*?

6. The classification of economic activities into 5 types on page 80-81 is important, think it through enough to come up with examples of each type.

7. Using the "rule of seventy" how long will it take to double your salary assuming you get raises of 4% per year? (pg. 60, also see note below concerning why the "rule" works)

<u>Commentary on the second weeks readings</u>:

Editorially this Chapter is rough. The reasons probably go to multiple rewrites, multiple authors and carelessness. Most readers don't notice many of the problems, however. Why? Well, most of us don't actually pay much attention to the numbers in texts. Example: on page 51, column 1, "734" should be "743" and "295" should be "298." Not memorable or even troublesome errors. Further, notice Tables 2.1 and 2.2; they use the same source document but from different years. Why not be consistent? Other dates are missing altogether (Figure 2.3). Some of these are vestiges of old editions; page 58, column 2: "with more than 4 billion people already and another billion expected by the year 2000." BUT, the population was 5.8 billion in mid-1997!! Some of the careless errors are kind of silly, like the confusion of *chickenpox* for *smallpox* (page 62) and reference to the "average annual rate of rate" (page 60). Please read past these examples of carelessness; the underlying content is still relevant. BTW these problems are NOT the kind of detail I'll put on tests.

The following derivation will **not** be on your test either but I offer it because some students ask *"Why does the 'rule of seventy' work?"* (If logarithms scare you, maybe you shouldn't venture any further!)

The answer relies on the formula for *Compound Interest:*

$$P_2 = P_1 \cdot (1.0 + r)^n$$

Where, P_1 is the "principle" (or population in this case) at some time 1, and P_2 is the population at some time 2; r is the annual rate of increase (expressed as a proportion), and n is the number of compounding periods, years in this situation.

When we are considering "doubling times" then P_2 will be exactly twice P_1 by definition. So, we can write:

$$2 \cdot P_1 = P_1 \cdot (1.0 + r)^n$$

We want to know what n will produce this increase, given that we know what r is. Now, divide both sides by P_1 and we get:

$$2 = (1.0 + r)^n$$

Next, take natural logs of both sides (no, I don't expect you will learn logs for this class, but if you know them this will make sense).

$$\ln 2 = n \cdot \ln(1.0 + r)$$

and solve for n

$$n = \frac{\ln 2}{\ln(1.0 + r)} = \frac{0.693}{\ln(1.0 + r)}$$

Now in the range of rates we will typically be working, ex. 0.02 (2%), 0.05 (5%) or even 0.25 (25%), $\ln(1.0 + r)$ is roughly equal to r.

For example:

ln (1.02) = 0.0198
ln (1.05) = 0.0487
ln (1.10) = 0.0953

So, $\frac{70}{5} = 14$ is very close to $\frac{0.693}{0.0487} = 14.23$

So, the "70" comes from rounding 100 x 0.693 or 100 times the natural log of 2. Try it out yourself.