Economic Development: Fall 1997
Problem set 1: Structures of developing economies, and the meaning of economic development

1. Choose 6 countries (two from least developed, two from middle income and two from highly developed) and from the appendix tables of the 1996 World Development Report collect information on a few important development indicators (as discussed in the class) and prepare a table. (**The appendix tables of the World Development Report is also available from my home page).**

2. Read chapter 2 of Todaro to understand the structure of less developed countries.Comment on the similarities of these characterisitics that you find among the countries within the same income group and the main differences in these characteristics that you find between income groups?

3. read chapter 2 of Todaro, and Chapter 1 of my chapter to understand the problems of measurement of development and living standard.

   (a) Comment on the following: The essence of the argument that per capita income and growth rates can be misleading indicators of development is that these measures ignore the distribution of income and the fruits of growth.

   (b) Explain why purchasing power parity (PPP) measures of income levels tend to show a smaller difference between poor and rich countries.

   (c) What are the problems of using per capita income as a good indicator of level of development?

4. What is meant by development? Why do we need a separate discipline as Development Economics?

5. The average annual (discrete) growth rates in per capita real real GNP of a few countries over the period 1965-1984 are given below:

Country	average annual growth rate in per capita GNP	Per capita Real GNP(1984)$
India	1.6	260
Indonesia	4.9	540

Philippines	2.6	660
Malaysia	4.2	1980
Korea	6.6	2110
Hong Kong	6.2	6330
Japan	4.7	10,630
U.S.	1.7	15,390

(a) Compute the number of years each country requires to double up their current per capita real GNP, assuming that they will continue to grow at this rate.

(b) Compute the number of years each country requires to attain the 1984 standard of living of the U.S., assuming that they will continue to grow at this rate.

(c) When in future, if at all, each of the above countries will catch up with the US standard of living.

(d) What is the exponential growth rate of each country corresponding to its above annual growth rate. (Show your calculations).

(e) Repeat (a) if the growth rates in the above table are instead average annual exponential growth rates.

6. A country's real GNP and population are given below for the period 1779-1789.

Year	GNP	Population
1779	286.5	151.7
1780	330.8	154.3
1781	348.0	156.9
1782	366.8	159.6
1783	366.8	162.4
1784	400.0	165.3
1785	421.7	168.2
1786	444.0	171.3
1787	449.7	174.1
1788	448.0	177.1
1789	487.9	180.8

Calculate the annual average growth rates of GNP, population, and per capita income during 1779-1784 and 1785-1789 and also for the period 1779-1789.

Anwser Key:
Problem #5

(a) Doubling up time T corresponding to a grwoth rate r is given by the formula: $T = \frac{\ln 2}{r}$. See the table below for calculations

(b) Let T be the time it takes for a country with gorwth rate r and with initial level of per capita income y_0 to attain the current US standard of living $\bar{y} = \$15,390$, then T is given by $T = \frac{\ln(\bar{y}/y_0)}{r}$. Calculations of T for various countries are in the following table.

(c) Let T be the time in future when a country with grwoth rate r and initial per capital income y_0 will catch-up with the per capita income. Then T must satisfy:

$$y_0 e^{rT} = 115390 e^{0.017T} \text{ which implies } T = \frac{\ln(15390/y_0)}{r - 0.017}$$

the calulations of T for various countries are shown in the following table.

Country	T of (a)	T of (b)	T of (c)
India	43.32	255.05	never
Indonesia	14.14	68.36	104.68
Phillipines	26.66	121.12	349.91
Malaysia	16.50	48.82	82.02
Korea	10.50	30.10	40.55
Hong Kong	11.18	14.33	19.74
Japan	14.74	7.87	12.33
US	40.77	-	-

Problem 6:

OBS	YEAR	GNP	Y	POP	$g˙P$	PCY	$g˙PCY$
1	1779	286.5	.	151.7	.	1.88860	.
2	1780	330.8	0.15462	154.3	0.017139	2.14388	0.13517
3	1781	348.0	0.05200	156.9	0.016850	2.21797	0.03456
4	1782	366.8	0.05402	159.6	0.017208	2.29825	0.03619
5	1783	366.8	0.00000	162.4	0.017544	2.25862	-0.01724
6	1784	400.0	0.09051	165.3	0.017857	2.41984	0.07138
7	1785	421.7	0.05425	168.2	0.017544	2.50713	0.03607
8	1786	444.0	0.05288	171.3	0.018430	2.59194	0.03383
9	1787	449.7	0.01284	174.1	0.016346	2.58300	-0.00345
10	1788	448.0	-0.00378	177.1	0.017231	2.52964	-0.02066
11	1789	487.9	0.08906	180.8	0.020892	2.69856	0.06678

For period 1779-1784 average linear growth rates are:

Variable	Mean
g˙Y	0.0702311
g˙P	0.0173198
g˙PCY	0.0520125

For period 1785-1789 average linear growth rates are:

Variable	Mean
g˙Y	0.0410502
g˙P	0.0180887
g˙PCY	0.0225137

For period 1779-1789 average linear growth rates are:

Variable	Mean

$\dot{g}_Y$	0.0556407
$\dot{g}_P$	0.0177042
$\dot{g}_{PCY}$	0.0372631

Note: the above growth rates are not in percentage. You multiply each grwoth rate with 100 to get percentage.