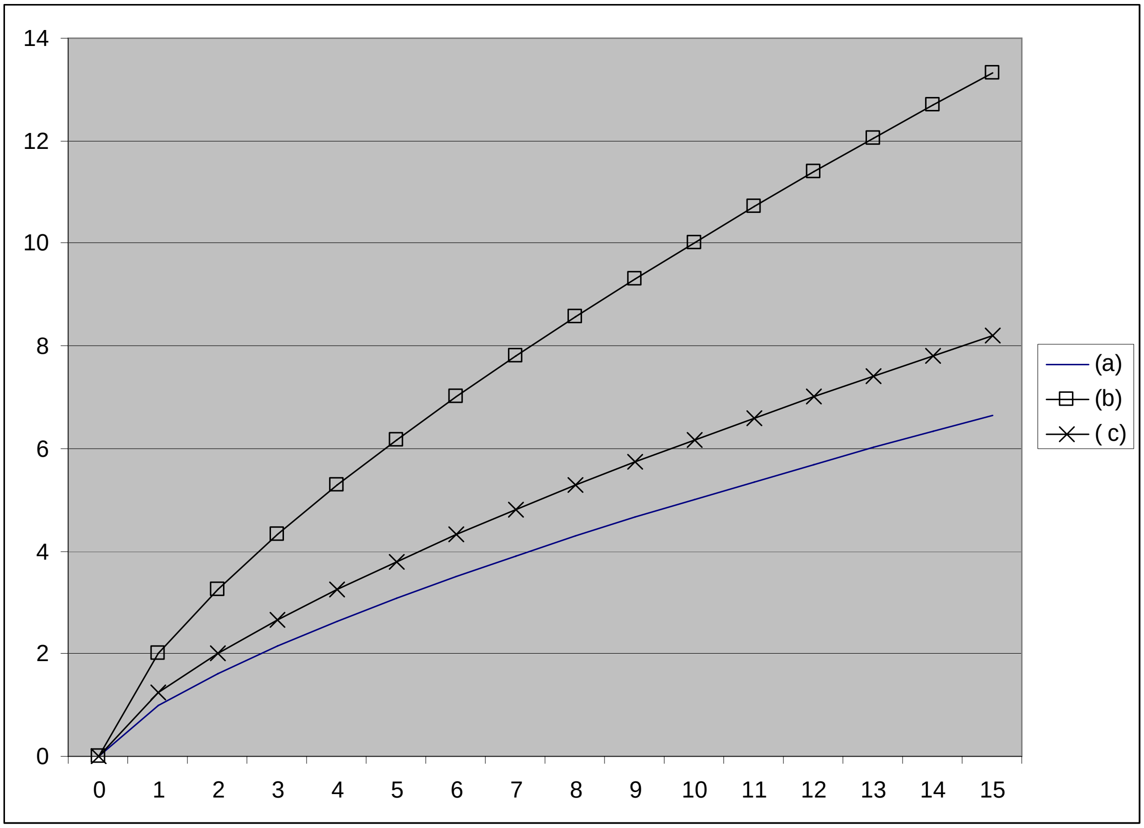
Business Cycles FE436 Problem Set 4
Professor Cunningham

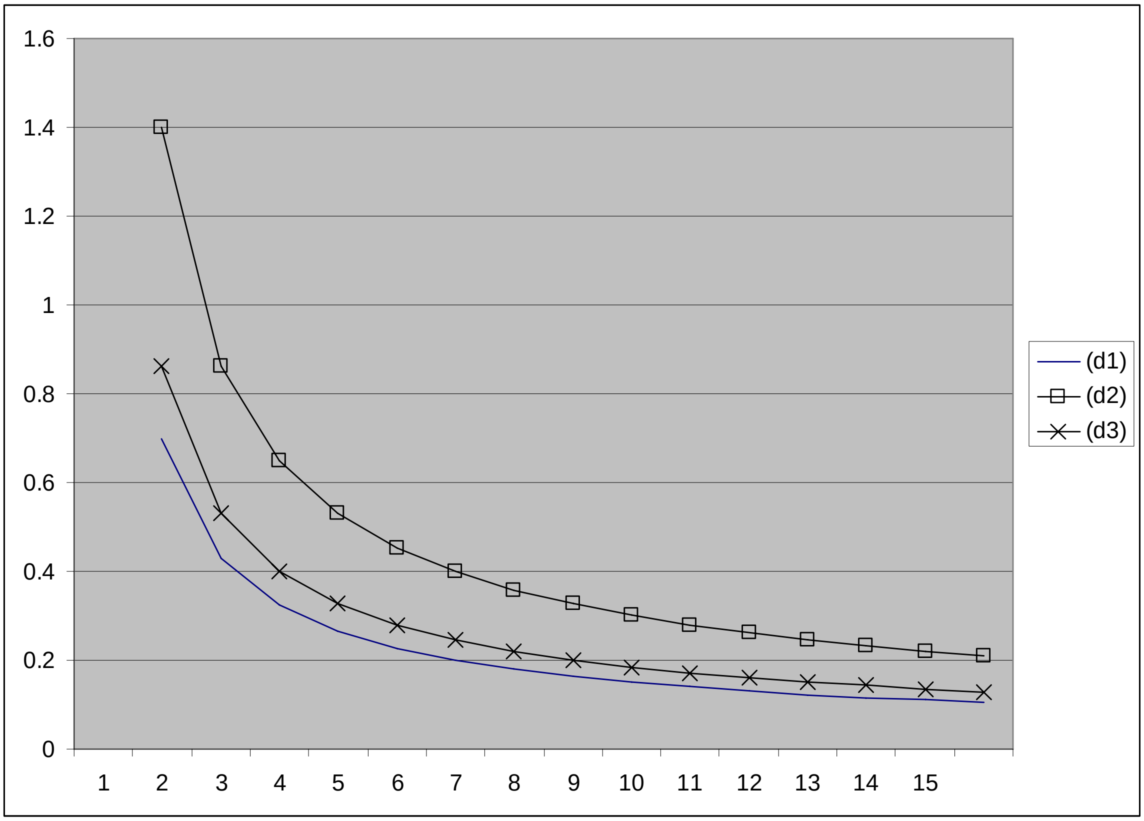
Question 1

Question 13 on page 138 of Williamson



The answers to (a) (b) and (c) are above. The production function has a steeper slope whenever productivity or capital increases. Productivity has a larger impact on the production function, relative to capital.

Here is the answer to (d):



The marginal product of labor is always declining. An increase in capital or technology will increase the marginal product of labor for all levels of labor. Productivity has a larger impact on the marginal product of labor.

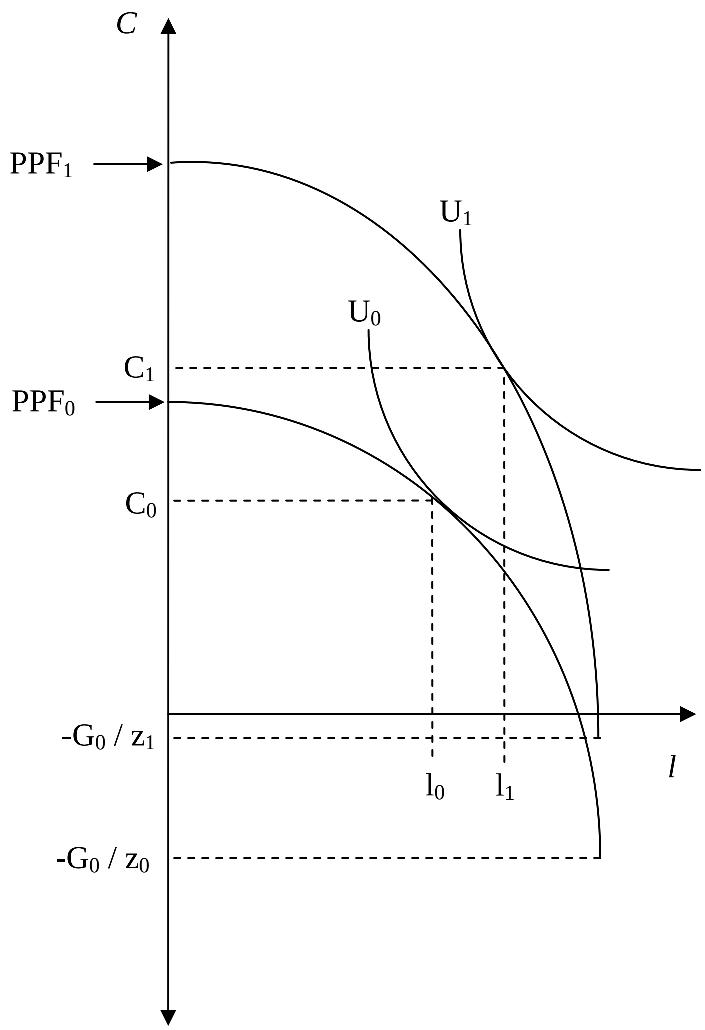
<u>Question 2</u>

Question 4 on page 178 of Williamson

Now, the consumer's fundamental budget constraint is:

$$C = wN^S + \Pi - T = Y - (G / z)$$

So, when $N^S = 0$ ($l = h$), $C = - G / z$. Our PPF becomes:



so that the lowest point on a PPF is determined by – G / z. Suppose the economy initially starts with the curves and variable values labeled with a 0 subscript above. Then, technology improves to $z_1 > z_0$ so that the lower bound of the PPF becomes negative G_0 / z_1 and the slope of the PPF increases simultaneously (since the marginal product of labor is higher).

The new curves and variable values after this change occurs have a 1 subscript above. Consumption increases (a standard result). In addition, leisure is even more likely to increase. The productivity increase causes the real wage, and labor income, to rise. In the traditional RBC model, this income effect will cause consumption and leisure to rise but the substitution effect of a higher opportunity cost to leisure will dampen the increase in leisure. However, in this new version of the RBC model there is an amplification of the income effect in that the productivity improvement *lowers* the taxes which the government must collect to finance fixed expenditures. This is a second source of income increase for the consumer. Therefore, it is even more likely that leisure rises (employment falls). In summary, utility will clearly rise, consumption increases, output therefore increases (by the NIA), and the real wage increases (we are on a steeper portion of a steeper PPF).