1. Consider two workers with identical preferences, Phil and Bill. Both workers have the same life cycle wage path, meaning they face the same wage at every age and they know what their future wages will be.

   (a) Explain how the life cycle path of wages will influence their hours of work decisions over time. How does this intertemporal model differ from the static model of labor supply?
   (b) Compare the life cycle path of hours of work of the two workers if Bill receives a one-time, unexpected inheritance at age 40. Draw a graph and explain the result.
   (c) Compare the life cycle path of hours of work of the two workers if Bill had always known that he would receive (and in fact does receive) a one-time inheritance at the age of 40. Draw a graph and explain the result.

   [Assume that both leisure and consumption are normal goods.]

2. A 60-year-old worker, whose life expectancy is 80 years, has two choices. She can work five more years, earning $50,000 per year, retire at age 65, and collect $12,000 in retirement benefits for each year for the next 15 years; or she can retire at age 60 and collect $X in retirement benefits each year for the next 20 years.

   (a) What value of X gives the worker the same total income in the two options?
   (b) What value of X gives the worker the same total retirement benefits in the two options?
   (c) Suppose anyone aged 65 and older receives state-provided medical insurance for free. A worker also has access to the same medical plan for free as long as she continues to work. If she is under 65 and does not work, however, she can purchase a similar health insurance for $6,000 each year. If she values retiring at age 60 over age 65 at $200,000, for what value of X would she retire at age 60?

   [Assume throughout the problem that a dollar received today has the same value as a dollar received at any time in the future]

3. Jack and Jill are a married couple. Suppose that Jack's wage rate is $20 and that his marginal product of time in the household sector is $25 per hour. Suppose that Jill's wage rate is $30 and that her marginal product of time in the household sector is $15 per hour.
(a) Derive the household's opportunity frontier in a "Market Goods – Household Goods" diagram. Give an explanation of the segments / kinks of this opportunity frontier.
(b) Who of the two will specialize in the household sector, and who will specialize in the market sector? Why?

[Assume that both Jack and Jill have each 10 hours a day to allocate to either work in the labor market or household production.]

4. Consider the short-run labor demand curve for an individual firm, which we derived in the lecture (section 3.3.2.). We have seen that this curve is given by the downward-sloping part of the VMP_E curve after its intersection with the VAP_E curve. Regarding the position of the curve, we have seen that facing a wage decrease the firm moves down on the same labor demand curve, while an increase in the price of the output shifts the short-run labor demand curve out. Now suppose the firm makes use of a new energy drink "Workaholix" that doubles the productive efficiency of each worker.

(a) Does this change in the worker's productivity change the position of the short-run labor demand curve for the firm? If so, how, and why? If not, why not?
(b) Assuming that the wage rate stays constant, and that the firm could supply enough energy drinks for any additional workers, would you expect an effect on the firm's level of employment induced by this change in productivity? If so, what kind of effect, and why (not)?

5. Consider the long-run employment decision of a perfectly competitive firm, and suppose that this firm faces a monthly salary of $2,550 per worker and monthly capital costs of $1,700 per unit. Suppose the cost-minimizing level of employment is E*=120 workers, and that this cost-minimizing level is attained at a cost outlay of C_0=$663,000 per month.

(a) What is the optimal level of units of capital K* associated with E*?
(b) Which condition has to hold at the cost-minimizing allocation of capital and labor? Give an interpretation of this condition.
(c) Sketch the solution in a capital/labor diagram. Then suppose that the monthly salary decreases to $2,040 per worker. What can we say about the new cost-minimizing point of K and E? Specifically, what happens to the isocost line? Will the firm increase or decrease its initial cost outlay C_0? Why?