RESOURCE CONSTRAINT AND LABOR SUPPLY

Problem #1
Assume a typical Irish farm produced 20 sacks of wheat and 40 sacks of potatoes a year. The farmers were producing primarily for their own need so that only the production surplus was sold by them. The prices of wheat and potatoes were the same and amounted to 1.
a) Specify, how a typical farmer will allocate his resources assuming that he equally values both goods and, therefore, his utility function for these goods can be approximated by the formula: $U = wheat*potatoes$.
b) In a certain period the production of potatoes decreased dramatically and amounted to 60% of the initial level. At the same time the price of potatoes doubled. Determine how these changes could have influenced the situation of the farmer and the allocation of his new resources.
c) What increase in the price of potatoes would compensate the farmer the dramatic decrease in production?

Problem #2
Jacob works for an internet company. For regular hours (160 hours a month) he earns 20 *zloty* per hour. For each extra hour he is paid 30 *zloty*. His other source of income is renting an apartment he inherited from his grandmother, which yields him 1000 *zloty* a month. His utility function is given by $U(C,R) = C*R$, where C stands for the value of consumption, while R denotes the number of hours devoted to leisure. He has 320 hours a month at his disposal for work and leisure. How many hours will he work? Supplement your solution with a detailed graph.

Problem #3
The only factory in a certain city is planned to undergo restructuring. The workers employed in this factory are offered two options:
a) they can work only 20 hours a week at 6 *zloty* per hour; or
b) they can work any amount of hours they like at 4 *zloty* per hour.
Which of these options will a typical worker choose if he has 100 hours of free time per week and his utility function may be approximated by $U(C,R) = C^2R^2$? The social fund is paying out 100 *zloty* a week to every worker regardless of the working scheme they choose.