A firm makes two different metal valves, type A and type B. Each type A valve requires 20 pounds of raw material and 10 hours of labor and sells for $500. Each type B valve requires 15 pounds of raw material and 20 hours of labor and sells for $750. The firm has 10 employees on salary for 40hours/wk each and, for an extra $22.50/hr, can work overtime up to an additional 40 hours each. They have a contract for 500 lbs of raw materials delivered weekly, with an option to have extra material delivered for $9/lb. Weekly demand for type A valves is 25, weekly demand for type B valves is 20.

a) What mix of valves A and B maximizes weekly sales revenue without using overtime or extra material?
b) Should the company have any extra material delivered without scheduling any overtime? If so, how much?
c) Should the company schedule overtime assuming it has already taken whatever action was determined to be optimal in (b)? If so, how much?
d) Assuming the company always gets paid for the product it produces each week AFTER it must pay for any extra material and labor it uses in that week, and before it must pay for any extra material and labor it uses in the following week, how much extra investment capital does the company need to maximize profit?
e) If the company only has $5000 available investment capital to increase production, what allocation of those funds for more material and labor maximizes the firm' net profit?
f) Assuming the firm buys the extra material and labor determined optimal in (b), then, starting from the primal solution to (b), what is change in the optimal revenue per unit
    i. increase in material?
    ii. decrease in material?
    iii. increase in labor?
    iv. decrease in labor?
    v. increase in demand for type A?
    vi. decrease in demand for type A?
    vii. increase in demand for type B?
    viii. decrease in demand for type B?
g) What are the rates of change listed in (f) at the primal solution to (c)? at (d)?
h) What is change in the optimal profit per dollar investment capital at the solution to (e).