Exam Decision and Risk januari 2019

Question 1 (10/90):
Give the gradient and the Hessian of f(x,y) = e^(x+y) + e^(x-y)

Question 2 (10/90):
Given a utilisation function u(x) = 2x + 1

a. Is this person risk-averse, risk-neutral or risk-seeking
b. The person with above utility function has $20 000 and can choose between following 2 lotteries:
   - L1 with a chance of 1 to lose $1000
   - L2 with a chance of 0.9 to lose $0 and 0.1 to lose $10 000

   Which lottery does the person prefer and what is the risk premium of L2

Question 3:
Ski jackets can be bought from supplier at 60$/unit. During season, they can ask a price of 130$. D is between 200 & 300. Any leftovers can be sold off season at 50$/unit.

A. When no uncertainty (Demand at its average), which decision do you make in terms of how many units you buy from supplier and what is corresponding optimal profit? Explain
B. Given the decision made in A, which is most pessimistic and optimistic scenario when you take into account uncertainty of demand? Give for each scenario the profit as well!
C. Fill in some formulas for cells in excel sheet (very similar as in example exam questions)
D. Would you expect a difference between the simulation and the solution you got in A)?

   -> flaw of average-question (same as example exam)

E. Interpret outcome of @risk graph of simulation (median profit and probability that profit is more than 18 000)

Question 4:
You own a production plant and are contractually bound to deliver a certain amount of units to your client

Month 1	Month 2	Month 3	Month 4
900	D2	D3	D4

You want to upgrade your plant capacity in month 3, but this means that the cost will temporarily go up and the capacity down, the effect of the upgrade can already be seen in month 4

	Month 1	Month 2	Month 3	Month 4
Capacity	1200	1200	600	1800
Cost/unit	120	120	180	100

You can also hold inventory for a cost of €20 per unit per month. Your inventory at t = 0 is zero

Also given: (same as example exam)

- An excel model with optimal numbers + one with formulas showing
- Sensitivity Analysis
- Solver pop-up (with parts missing)

a. Complete the model (fill in the '...')

minimize …

subject to

P1 >= 900	demand month 1
P2 >= D2	demand month 2
P3 >= D3	demand month 3
P4 >= D4	demand month 4
…	Inventory month 1
…	Inventory month 2
…	Inventory month 3
…	Inventory month 4

P1, P2, P3, P4, I1, I2, I3, I4 >= 0

b. Complete the solver pop-up

Same as example exam

c. Problem: the machines need an update, this will result in a 10% lower production that month and needs to happen in month 1 or month 2, which one do you prefer?

Sensitivity analysis: look at shadow price + range

d. It is now possible to work overtime. You can only increase production with 10% (don't have to use it all), but the overtime work costs 20% more than regular work. Put this in the algebraic or spreadsheet model

e. Every month you manufacture, you should pay €1000, put this in the spreadsheet model