1(a)

Deb and Frank

[in parenthesis, the weight of each question for problem 1 with respect to the entire exam]

Deb and Frank have the following utility functions:
$U_D = x_D + 2y_D$ and $U_F = x_F^{\alpha} y_F^{1-\alpha}$ with $\alpha \in (0,1)$.

Their endowment is one unit of good y for Deb and one unit of good x for Frank.

a) **[8%]** Determine the expenditure function for Frank. What happens with the expenditure if all prices are multiplied by the same number?
Fill in your answer here and/or on sketching paper

b) **[5%]** What is the elasticity of substitution for Deb? what is the implication for the income and substitution effects?
Fill in your answer here and/or on sketching paper

c) **[5%]** Interpret now x and y as follows. In a risky setting, x is the amount of money in state X and y is the amount of income in state Y. The expected utility functions of Deb and Frank are, respectively:
$U'_D = \frac{1}{3}x_D + \frac{2}{3}y_D$ and $U'_F = \alpha \ln x_F + (1-\alpha)\ln y_F$ with $\alpha \in (0,1)$.
Show that the expected utility functions U'_D and U'_F represent the same preferences as the utility functions U_D and U_F. For which α do the utility functions for D and F have the same MRS at the 45 degree line?
Fill in your answer here and/or on sketching paper

d) **[5%]** Compute Deb's certainty equivalent at her endowment.
Compute the Arrow-Pratt index of absolute risk aversion for Frank.
Fill in your answer here and/or on sketching paper

e) **[10%]** Compute the Walrasian equilibrium for this economy.
Fill in your answer here and/or on sketching paper

Maximum marks: 33

Maximum marks: 35

1(b) HydroP

To produce electricity E, firm HydroP uses water W and a plant P as main inputs. It operates in a unique location, so that no further plants can be built. Without the plant the production is 0. With the plant, electricity can be produced according to the following production function:

$$E = \begin{cases} 0 & \text{if } W < \underline{W} \\ 4W & \text{if } \underline{W} \leq W \leq \bar{W} \\ 3\bar{W} & \text{if } \bar{W} < W \end{cases}$$

a) **[5%]** Is this production function: continuous? increasing? strictly quasiconcave? quasiconcave? increasing/decreasing/constant returns to scale?

Fill in your answer here and/or on sketching paper

b) **[7%]** Determine the cost function for this firm (let the price of water be p_w and let K be the cost of the plant). Is the cost function continuous?

Fill in your answer here and/or on sketching paper

c) **[5%]** Can one recover the original production function from the cost function? Why not?

Fill in your answer here and/or on sketching paper

Maximum marks: 17

(a) **10%**

For each of these games, determine the set of rationalizable strategies for each player, and find the Nash equilibrium/a.

Fill in your answer here and/or on sketching paper

Format

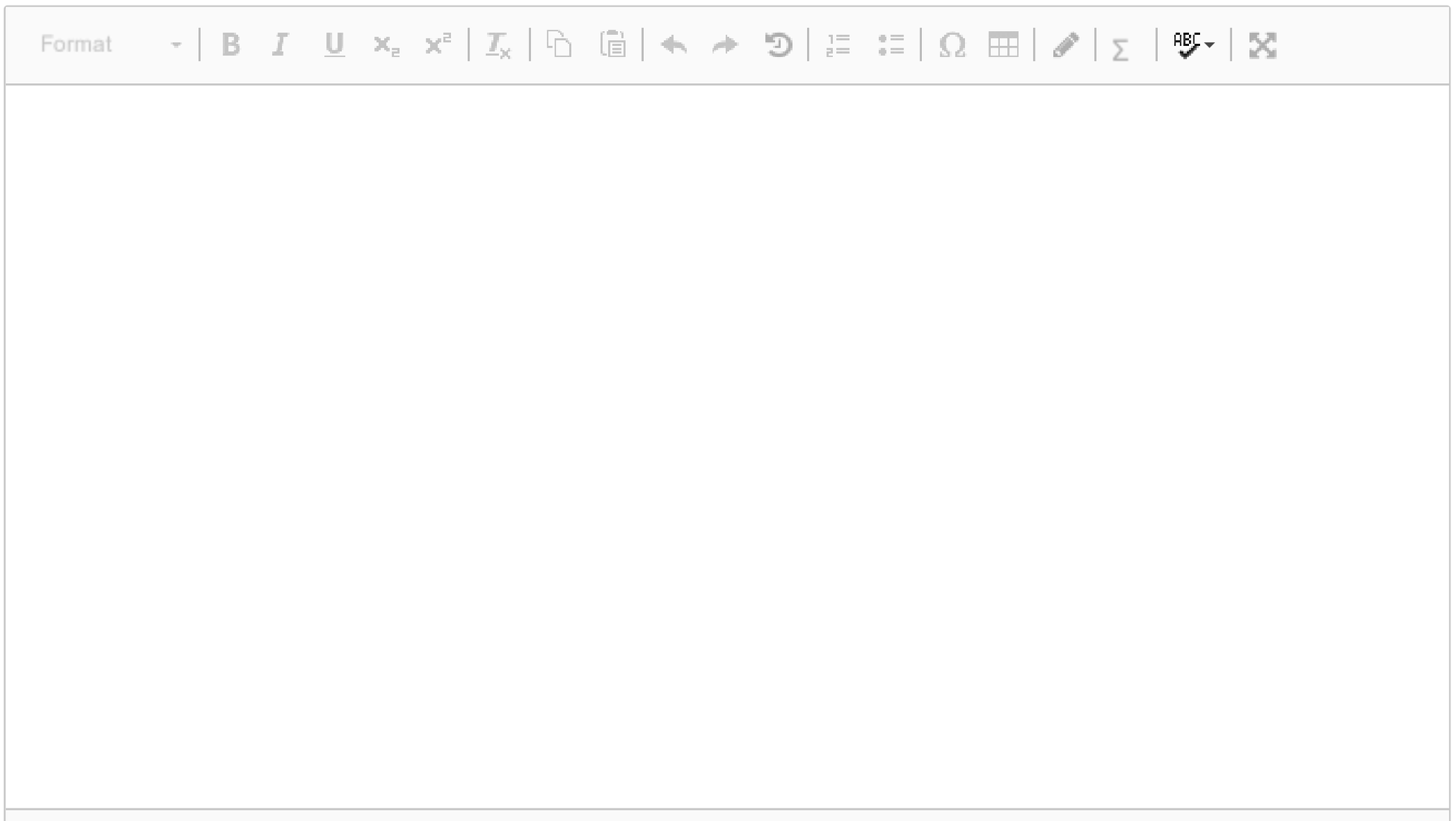
Words: 0

Maximum marks: 10

(b) **8%**

Assume next that only *I* knows his own type (so that *I* is informed), while player *U* thinks that the two types of *I* are equally likely (so that *U* is uninformed). Model this situation in an ex ante perspective by specifying the Bayesian normal form.

Fill in your answer here and/or on sketching paper



Maximum marks: 8

(c) **8%**

For the Bayesian normal form found in part (b), determine the set of rationalizable strategies for each player, and find the Nash equilibrium/a.

Fill in your answer here and/or on sketching paper

Format

Words: 0

Maximum marks: 8

(d) **12%**

Assume now that *I* acts before *U*, and that *I*'s choice of *D* or *N* can be observed by *U* before she makes her choice of *C* or *E*. Show that there are two kinds of perfect Bayesian equilibria: one separating equilibrium and one pooling equilibrium. Which of these are more reasonable?

Fill in your answer here and/or on sketching paper

Format

Words: 0

Maximum marks: 12

(e) **12%**

Assume now that *U* acts before *I*, where *U* can choose between the four strategies *CC'*, *CE'*, *EC'* and *EE'*. The first letter corresponds to what *U* will do if *I* chooses *D*, and the second letter corresponds to what *U* will do if *I* chooses *N*. (So *EC'* is a commitment that the insurance company will offer expensive insurance if the individual accepts a deductible and will offer cheap insurance if the individual insists on no deductible.) The choice of *CC'*, *CE'*, *EC'* or *EE'* can be observed by *I* before he makes his own choice. Show that there is a unique subgame perfect Nash equilibrium outcome of this game.

Fill in your answer here and/or on sketching paper

Format | B I U x_2 x^2 I_x | Ω | ∑ | ABC

Words: 0

Maximum marks: 12