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Summer Semester 2011

Business Decision Making

Course No. 20115

Final Exam

July 18, 2011

The total time for this exam is 60 minutes. The exam consists of three questions. The importance of each question and sub-question is indicated by the points that you can achieve. The maximum number of points that you can achieve in the exam is 60. Please provide your answers in the predetermined boxes after each question. The back sides of each page can be used for auxiliary calculations. It is not allowed to open the binding. Note your name and student identification number in the box below.

Admitted Aids: Non-programmable pocket calculator; dictionary without hand-written notes.

Name:..... Student Identity Number:.....

Q1	Q2	Q3	Total	Grade

Question 1 (24 points):

Keilee Long is looking for an optimal tennis club. After analyzing regional opportunities she considers three offers as the most relevant: **Otterslebbe** United, **Stattfeld** Warriers and **Neustadl** Smashers.
Her overall goal can be characterized by two sub-goals: *proficiency level* and *training conditions*. As a decision analyst you want to make the choice as practicable as possible for Keilee and therefore apply the Analytic Hierarchy Process.

Upon request, Keilee stated that concerning her overall goal, *proficiency level* is twice as important as *training conditions*. At the same time *club size* is three times as important as *quality of players* (both are sub-criteria of *proficiency level*), whereas *opening hours* is two times as important as *quality of trainer* and as *quality of equipment* (all three are sub-criteria of *training conditions*).

a) Set up the decision hierarchy to illustrate the decision problem at hand. **(4)**

b) Consider the received comparisons of all alternatives with respect to the sub-criterion *quality of players:*

quality of players	Stattf.	Otters.	Neust.	ω
Stattfeld	1	2	4	
Otterslebbe	1/3	1	1	
Neustadl	1/3	1	1	

Calculate the **maximum eigenvalue** of the characteristic equation of this matrix (sub-criterion *quality of players*)! **(7)**

c) Determine the **priorities** of the three alternatives with respect to the sub-criterion *quality of players*. If you were not able to calculate the maximum eigenvalue in b) use an estimate to determine the priorities instead. **(7)**

d) For all other pair-wise comparisons of alternatives your assistant already calculated the priorities, structured in the following matrix:

X	ω club size	ω opening hours	ω quality of trainer	ω quality of equipment
Stattfeld	0.57	0.69	2/3	0.14
Otterslebbe	0.29	0.23	2/9	0.57
Neustadl	0.14	0.08	1/9	0.29

Determine Keilee's optimal alternative, based on the given data. If you were not able to calculate the priorities in c) use estimated values instead. **(6)**

Question 2 (20 points):

a) In order to apply the concept of a value function in rational decision making under certainty, specific characteristics of individual preferences are postulated. Explain the necessary fundamental postulates (axioms). **(6)**

b) Which of the above axioms is violated in the experimental results, referred to as the "Allais paradox" and the "Ellsberg paradox". Explain and briefly comment the violations and their relevance for decisions under uncertainty. **(4)**

c) Uncle Luke wants to rent a lawn-mower. His final choice should satisfy two main objectives: average "*fuel consumption*" measured in liters per mile and "*maximum speed*" measured in feet per minute. Given that the above mentioned postulates are fulfilled, we can solve Luke`s decision problem using an additive value function. He therefore considers a **linear** individual value function for *fuel consumption* in a range of 2 to 8 liters per mile. The worst outcome receives the value 0 and the best outcome the value 100. For attribute *maximum speed* Luke was even able to determine the following individual value function:

$$\mathbf{U(speed)} = 100 \cdot \left(1 - \frac{1}{\sqrt{\frac{1}{10} \cdot \mathbf{speed}}} \right) \quad ; \quad \mathbf{for\ speed} \geq \mathbf{1}$$

Luke concludes that a lawn-mower consuming 3.5 liter of fuel per mile and reaching a maximum speed of 250 is just as good as a lawn-mower that consumes in average 2 liter of fuel per mile and has a maximum speed of 90 feet per minute. Which weights for both attributes can be derived from this statement in order to evaluate different alternatives? **(10)**

Question 3 (16 points):

a) Joe, a low-level engineer of wolkswaggon ltd. earning €100.000 within three years, is faced with an entrepreneurial opportunity as an alternative to his job. The project requires an initial investment of €10.000 to evaluate the technical feasibility. With a 50% probability it will be feasible, making a further investment of €90.000 necessary for the commercialization of the resulting product. In one out of two cases the product would be a market success with a profit of €500.000 within three years. Give a graphical representation that characterizes Joe's decision problem. **(9)**

b) Determine the income-maximizing calculus of the risk-neutral Joe on the basis of all given information. **(7)**