MASTER'S DEGREE EXAMINATION
Study major: Advanced Analytics – Big Data

1. Present the approach to data aggregation.
2. Present, how to join multiple tables – describe possible methods?
3. What are the differences between single row and multiple row functions? When should they be used? What are the data types appropriate to be used by them?
4. Describe the single row functions classification.
5. Describe statements that can change the content of the table. What are the possible results of their execution? What is the possible scope?
6. The role of the Data Dictionary. Describe the methods of work with Data dictionary.
7. The database objects - their roles, purposes, methods of using.
8. The views. Why are they created? What are the possible clauses in a statement that create a view?
9. The syntaxes of set statements. What are the set operators and the results of their use?
10. The subqueries. Describe types of subqueries, possible clauses they may be used, possible operators.
11. Describe typical solutions Big Data provides in the area of data storage.
12. Describe the meaning of 3V and 5V in the context of Big Data.
13. Discuss ethical issues related to Big Data.
14. Evaluate capabilities and specific characteristics of analytical environments used in Big Data.
15. Please describe in detail one chosen algorithm used in Big Data analytics.
16. What is MapReduce and how does it work?
17. What is Deep Learning, give an example.
18. What are the typical characteristics of Big Data problems?
19. What is data variability and how to take it into account in data visualization?
20. Discuss examples of pattern recognition techniques used in Big Data.
21. Define and describe distributed computing, in particular, in context of Big Data.
22. Describe a selected methodology describing a method of execution of development process of analytical models.
23. Outline key assumptions that are conditions of application of predictive models in support of decision making processes.
24. Describe how usage of version control systems influences the effectiveness of analytical solution development process.
25. Explain what is meant by the term reproducibility of analytical process and why it is important in business.
26. Describe most important methods of ensuring reproducibility of analytical process.
27. Explain what does the term cutoff threshold mean in classification models and describe what are factors that influence its optimal value in case when such a model is used for supporting decision making.
28. Explain how regularization in used in the process of building of predictive models.
29. Explain the difference between observational, interventional and counterfactual reasoning.
30. Explain Simpson's paradox.
31. List and discuss methods of visualization of spatial data

32. Economic gains from processing data in the cloud.
33. Present serverless computing in gathering and processing data for analytics.
34. Describe storing big data in the cloud.
35. Describe scaling document-oriented databases in the cloud - the case of DynamoDB.
36. Describe scaling analytical processes in the cloud.
37. Present Function as a service - data processing model based on the Lambda architecture.
38. Specify and discuss methods for visualizing proportions.
39. Present creating and managing security of analytical platforms in the cloud for Python and R.
40. Present managing security, users and access rights in the cloud - users, roles, policies and groups.
41. Present managing a relational database in the cloud and applications for data analytics.
42. Present data processing models for the cloud: IaaS (Infrastructure-as-a-Service), PaaS (Platform-as-a-Service) and SaaS (Software-as-a-Service).
43. Discuss the data properties relevant to the data analysis process.
44. What is the importance of the context in data analysis?
45. What is the uncertainty in data analysis and how can it be influenced?
46. What is the importance of metadata in data analysis?
47. Specify and discuss the coordinate systems used for data visualisation.
48. Specify and discuss methods for visualizing time series.
49. Specify and discuss methods of relationship visualization.
50. What descriptive statistics are robust on outliers?
51. Explain what a distributed version control system is using Git as an example. Propose a typical simple workflow.
52. Discuss a selected data dimension reduction technique, its strong and weak points.
53. Discuss the parallel computation concept and typical problems of parallel computations.
54. What is a robust estimator? Discuss using a selected example.
55. Discuss regularization techniques using a selected example, e.g., LASSO regression.
56. Explain the concepts of structured and unstructured data.
57. Introduce the Lambda and Kappa architectures.
58. Present the key features of learning and prediction in batch (offline learning) and incremental (online learning) modes.
59. Give an example and discuss in what situations it is advisable to use the OLTP processing model.
60. Give an example and discuss in what situations it is advisable to use the OLAP processing model.
61. Explain the concept and business applications of a data warehouse.
62. Describe the problem of time in streaming data processing, what is watermark.
63. Describe the difference between data stream and batch processing.
64. Describe two business applications of real-time data analysis.
65. List and describe methodologies of data mining process.
66. Describe two main groups of data mining methods.
67. Describe the methods of feature selection and sampling for data mining modeling.
68. Data classification methods - present differences and similarities between them.
69. Describe decision tree models.

70. Describe random forest models.
71. Describe models of artificial neural networks.
72. Describe methods of data clustering.
73. Describe methods of transactional data analysis.
74. Does the standard logistic regression model belong to the class of generalized linear models? Justify your answer.
75. Present the methods of parameter estimation of the logistic regression model.
76. Interpretation of the estimates of logistic regression parameters.
77. Verification of the significance of the estimates of logistic regression parameters.
78. Methods of assessing the fit of the logistic regression model to empirical data.
79. Methods of identifying outliers and influential observation in logistic regression.
80. Discuss the multinomial logistic regression model.
81. Discuss the proportional odds model.
82. Methods of selecting explanatory variables in regression models.
83. Data quality in business analytics. The meaning and assessment techniques.
84. Data imputation. The importance and meaning.
85. Multiple imputation: description of the method, selection of the imputation model and estimation of the parameters.
86. Methods and models for longitudinal data: description and applications in business analytics.
87. Compare fixed and random effects models. Indicate basic differences and provide examples of applications.
88. Quantile regression: description and applications in business analytics.
89. Adaptive regression: the model, estimation technique and applications in business analytics.
90. K-means method and its application in Customer Lifetime Value CLV models.
91. Name and describe business applications of Customer Lifetime Value CLV models.
92. Present methods of joining tables in SAS and SQL.
93. Present advantages and disadvantages of data processing in SAS and SQL.
94. What is the macroprogramming in SAS?
95. Present the pros and cons of sequential data processing and its other alternatives.
96. Present examples of procedures in Base SAS and SAS/STAT units.
97. What descriptive statistics are not affected by outliers?
98. What descriptive statistics should be used for samples taken from populations with a distribution other than the normal?
99. Present advantages and disadvantages of analytical and transactional data structures.
100. What is PDV and sequential data processing in SAS?

Literature:

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