NMSA413 Optimization Theory

Thematic rings for the exam:

1. Separation of sets.
   T1.42 with proof, T1.43 with proof, T1.44 with proof, D1.47, L1.48, L1.49, L1.50, L1.51, T1.52 with proof, T1.53 without proof

2. Farkas' lemma, its relation to duality in LP.
   T1.58 with proof, Ex2.42

3. LP - formulation, allowed transformations, set of all feasible solutions.
   whole section 2.1, D2.1, L2.2 with proof

4. LP - existence of an optimal solution.
   T2.15 with proof, Ex2.16

5. Basic theorem of LP.
   T2.21 without proof, L2.23 without proof, L2.25 without proof, T2.26 with proof, D2.29, T2.30 with proof, T2.31 without proof

6. LP - weak duality.
   dual pair, symmetric dual pair, T2.33 with proof, T2.34 with proof

7. LP - strong duality.
   T2.35 with proof, T2.36 with proof, T2.37 without proof

8. Simplex algorithm and Transportation problem.
   D2.43, L2.44 with proof, T2.45 with proof, T2.46 with proof, T2.47 without proof, T6.8 without proof, T6.9 without proof, (2.56), L2.53, L2.54, T2.55, (2.57), L2.56, L2.57, T2.58, (2.58)

9. FONC and FOSC for MP with convex objective function and convex set of feasible solutions.
   T4.1 with proof

10. FONC, FOSC, SONC, SOSC for MP with differentiable objective function and an inner point of feasible solutions.
    T4.10 with proof, T4.11 with proof, T4.12 without proof, T4.13 without proof

11. MP - general setup.
    D4.14, L4.15, L4.16 without proof, D4.17, L4.18, L4.19 without proof, T4.20, D4.21, L4.22 without proof, L4.23 without proof

12. Saddle point condition and FOSC for NLP.
    D5.4, T5.5 with proof, L5.6

13. Saddle point condition and FONC for NLP.
    D5.4, L5.6, D5.9, T5.10 without proof

14. Localized saddle point condition, FONC and FOSC for NLP.
    D5.11, T5.12 with proof, D5.13, T5.14 with proof

15. KKT optimality conditions, basic theorem on KKT.
    D5.17, D5.18, T5.19 with proof, D5.20, D5.21, L5.22, T5.23 with proof, Rem5.47

16. K-T constraint qualifications, FONC, FOSC for NLP.
    L5.24 without proof, D5.25, T5.27 with proof, T5.35 with proof

17. Constraint qualifications.
    D5.25, D5.28, T5.29 without proof, T5.30 without proof, D5.31, T5.32 without proof

18. SONC and SOSC for NLP.
    D5.36, T5.37 without proof, D5.38, T5.39 without proof

19. Saddle point condition and KKT for symmetric NLP.
    D6.1, D6.2, D6.3, T6.4 without proof, T6.5 without proof, T6.6 with proof, T6.7 with proof, T6.10, T6.11, T6.12 without proof

20. Quadratic programming.
    quadratic program, symmetric quadratic program, T6.16 with proof, T6.18 with proof, section 6.3.3

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