Summary of examinable material for Differential Topology

I De Rham cohomology of smooth manifolds

Examined on main paper

- Definition and homotopy invariance of de Rham cohomology
- Mayer-Vietoris sequence
- Graded algebra structure of de Rham cohomology
- Connected-sum construction, de Rham cohomology of connected sums
- De Rham cohomology of $\mathbb{C}P^n$
- Compactly supported de Rham cohomology
- Sard's theorem*; degree and its interpretation as count of pre-images
- Existence of good covers and tubular neighbourhoods*
- Künneth formula
- Poincaré duality
- Signature and Euler characteristic
- Poincaré dual of a submanifold and intersection numbers*
- Poincaré-Hopf index theorem*

II Singular (co)homology

Examined on mastery paper

- Definition and homotopy invariance* of singular (co)homology
- Hurewicz theorem*
- Mayer-Vietoris sequences*
- Definition of finite cell complexes; computing singular (co)homology via cellular (co)homology*
- Singular (co)homology of $\mathbb{C}P^n$ and $\mathbb{R}P^n$
- Special cases of universal coefficients theorem*
- De Rham theorem
- Graded ring structure of singular cohomology*
- Künneth formula for singular cohomology*
- Orientation and Poincaré duality*

*without proof

III Morse theory: not examined

Questions and corrections to `j.nordstrom@imperial.ac.uk`.
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