Lattice actions

- Derive the plaquette lattice action for the gauge field.

- Prove integration formulas for Grassmann variables.

- Derive the Wilson fermion propagator formula.

- Show that staggered fermions describe four degenerate fermion flavours.

Improved lattice actions

- Show that the twist can be transformed from the Wilson term to the mass term and vice versa.

- Prove the chiral WT-identities in tmLQCD.

- Derive the chiral states of domain wall fermions.

- Prove the GW-relation for Neuberger fermions.

Monte Carlo integration

- Prove that the Metropolis algorithm satisfies detailed balance.

- Show that min(1,R) in the Metropolis algorithm can be replaced by R/(1+R).

- Derive the recurrence relations for the exponential function of SU(3) matrices.

- Prove that detailed balance is satisfied by the noisy correction in PHMC.

Error estimates

- Prove the formula for variance in terms of the integrated autocorrelation.

- Show that the jackknife analysis gives the correct errors.