Preparation for test 2 / sample problems

1. a. **Precisely state definition** of . . . especially the C . . .-properties: closed, compact, connected, complete, continuous, converging, Cauchy, . . . limit, uniform, . . .

2. **Explicit examples / applications**

   (Without proof) for each of the following sequences decide whether it converges / whether it is a Cauchy sequence / find a converging subsequence (if it has one) / for each of the following subsets of \( \mathbb{R} \) find the set of all limit points

3. **Explicit examples / applications**

   Use the **\( \varepsilon-\delta \)-definition** of limit of sequence / limit of function / continuity to decide
   whether it converges / whether it is a Cauchy sequence / find a converging subsequence (if it has one) / for each of the following subsets of \( \mathbb{R} \) find the set of all limit points

4. Use the **\( \varepsilon-\delta \)-definition** of limit of sequence / limit of function / continuity to show . . . algebra (multiple, sum, difference, product, quotient), order (e.g. if \( \forall x \neq a, \ f(x) > g(x) \) then \( \lim \ldots \geq \lim \ldots \)), or composition.

5. **Using preimages and open/closed sets** e.g. theorem 4.3.5 or **\( \varepsilon-\delta \)-definitions** (uniformly) continuous function and Cauchy/converging sequence composition of (uniformly) continuous functions.

6. **Prove** . . . something with continuity, bounded, closed, uniform continuity
   b. Give an example that shows that the assumption of . . . cannot be omitted.