Reviewing for the Second MA 425 Test

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1. Sequences (3.5–3.6)
   
   (a) Important notions
      
      i. Cauchy sequence (3.5.1).
      ii. Cauchy’s convergence criterion (3.5.5).
      iii. Sequences that approach $\infty$ or $-\infty$ (3.6.1).
   
   (b) Important homework problems: all assigned.

2. Limits of functions (chapter 4)
   
   (a) Important notions
      
      i. Cluster point (4.1.1).
      ii. Limit of $f(x)$ at $x = c$ (4.1.4).
      iii. Sequential criterion for limits (4.1.8).
      iv. Boundedness of $f$ on a neighborhood of $c$ (4.2.1).
      v. Existence of limit implies boundedness on a neighborhood (4.2.2).
      vi. Limits of algebraic combinations of functions (4.2.4: $\epsilon$-$\delta$ proofs given in lecture and homework).
      vii. $\lim_{x \to c} f > 0$ implies $f > 0$ on a neighborhood of $c$ (4.2.9).
      viii. One-sided limits (4.3.1).
      ix. $\lim_{x \to c} f = L$ if and only if $\lim_{x \to c^+} f = L$ and $\lim_{x \to c^-} f = L$ (4.3.3).
      x. Infinite limits (4.3.5).
      xi. Limits as $x \to \infty$ or $x \to -\infty$.
   
   (b) Important homework problems: all assigned.

3. Continuous functions (5.1–5.4)
   
   (a) Important notions
      
      i. Definition of continuity (5.1.1).
      ii. Sequential criterion for continuity (5.1.3).
      iii. Dirichlet’s function is not continuous anywhere (5.1.5(g)).
      iv. Algebraic combinations of continuous functions are continuous (5.2.1).
v. Composition of continuous functions is continuous (5.2.6)
vi. Bounded functions (5.3.1).
vii. Boundedness Theorem (5.3.2).
viii. Max-min Theorem (5.3.4).
ix. Intermediate Value Theorem (5.3.6).
x. Uniform continuity (5.4.1).
xii. Lipschitz implies uniform continuity (5.4.5).

(b) Important homework problems: all assigned.

4. Derivative (6.1–6.2)

(a) Important notions
   i. The derivative (6.1.1).
   ii. Differentiable implies continuous (6.1.2).
   iii. Derivatives of algebraic combinations of functions (6.1.3).
   iv. Chain rule (6.1.6).
   v. Mean Value Theorem (6.2.4).

(b) Important homework problems: all assigned.