1. Define the total variation of a function f on an interval $[a,b]$.
2. What does the symbol $\mathrm{BV}[a,b]$ mean?
3. Suppose f is nondecreasing on $[a,b]$. Find $\bigvee_a^b f$.
4. Every $f \in \mathrm{BV}[a,b]$ can be written as the difference of two nondecreasing functions. How can these two functions be chosen?
5. When is a function $f:[a,b] \to \mathbb{R}$ called "Riemann-Stieltjes integrable"?
6. State the "Fundamental Inequality for Riemann-Stieltjes Integrals".
7. If f is continuous and g is 0 up to t but makes a jump to p at t and stays at p afterwards, find the Riemann-Stieltjes integral of f with respect to g.
8. State the "Integration by Parts Formula" for Riemann-Stieltjes integrals.
9. State the "Main Existence Theorem" for Riemann-Stieltjes integrals.
10. For which kind of integrands and integrators did we define lower and upper sums? How are they defined? What are the lower and upper Riemann-Stieltjes integrals? What is the "Main Existence Theorem" in this situation?
11. Define "pointwise" and "uniform" convergence of a sequence of functions $\{f_n\}$ to a function f on a set E.
12. Show that $\{x^n\}$ converges uniformly on $[0,1/2]$ but not on $[0,1]$.
13. State the "Cauchy Criterion" for uniform convergence.
14. Describe the "Weierstraß M-Test".
15. State the three main theorems on continuity, integrability, and differentiability of the limit function. Also state the corresponding corollaries for series.
16. What is a norm? What is a metric? What is a Banach space?
17. Which norm makes $\mathrm{C}[a,b]$ into a Banach space?
18. What is an equicontinuous family of functions?
19. State the "Arzelà-Ascoli Theorem".
20. State the "Weierstraß Approximation Theorem".