Math 454, Fall 2018

**PROBLEM SET 3** 

## Due date to be announced

D. Jakobson

Do any 8 of the following problems. Every problem is worth 10 points.

**Problem 1.** Royden/Fitzpatrick, Chapter 4, Problem 13, 21, 27, 32 (extra credit), 33, 35 (extra credit), 36 (extra credit), 38, 39 (extra credit), 40, 44 (extra credit), 46, 50 and 51 (one problem), 52 (extra credit).

**Problem 15** (extra credit). Compute  $\int_0^1 \varphi(x) dx$ , where  $\varphi(x)$  is the Cantor-Lebesgue "staircase" function from Chapter 2. This function is continuous, so we can use Riemann integral here!

**Problem 16** (extra credit). Let  $f : \operatorname{Mat}_{n \times n}(\mathbb{R}) \to \mathbb{R}$  be a linear real-valued function on the space of  $n \times n$  matrices, such that f(AB) = f(BA) for any two matrices A, B; and such that  $f(\operatorname{Id}_n) = n$ . Show that  $f(A) = \operatorname{trace} A$ , i.e. f is the trace of a matrix.

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