

University of Colorado Boulder
Math 4001, Midterm, Part 2, Take-Home

Fall 2019

NAME: _____

HONOR CODE: On my honor, as a University of Colorado Boulder student, I have neither given nor received unauthorized assistance.

SIGNATURE: _____

Question	Points	Score
1	20	
2	20	
Total:	40	

- Only the course textbook by Rudin, lecture notes and your HW solutions are allowed.
- Read instructions carefully. Show all your reasoning and work for full credit.
- You can type or handwrite your answers. Copy the statement of each problem.

1. (20 points) If $\sum_n a_n$ and $\sum_n b_n$ are two series of nonnegative real numbers, prove that $\sum_n a_n$ and $\sum_n b_n$ converge if and only if $\sum_n \sqrt{a_n^2 + b_n^2}$ converges.

2. (20 points) Prove or disprove: If $\{f_n\}$ is a sequence of continuous functions converging uniformly on $[0, 1]$ to f , then

$$\lim_{n \rightarrow \infty} \int_0^{1-\frac{1}{n}} f_n(x) dx = \int_0^1 f(x) dx.$$