

Homework 7 for Math 131BH Honors Analysis

Burt Totaro

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Due on Tuesday, March 14.

Rudin, p. 239: 16, 17, 21, 23.

(1) Compute the derivative of $\arctan(x)$ for $x \in \mathbf{R}$. Use that calculation to show that $\arctan(x)$ is an analytic function, equal on $(-1, 1)$ to a power series around $x = 0$. Compute the power series.

Use Abel's theorem (Theorem 8.2 in Rudin) to show that $\arctan(x)$ is also equal to the sum of the series when $x = 1$. Does that hold when $x = -1$? Using the result for $x = 1$, give an explicit formula for π as an infinite series.