



Exercise 1. Textbook exercise A.4.3.

Exercise 2. Textbook exercise A.4.5. [*Suggestion:* Recall that $\lim_{x \rightarrow \infty} (1 + \frac{1}{x})^x = e$. To deal with the endpoints it's also helpful to use Stirling's approximation, $n! \sim \sqrt{2\pi n}(n/e)^n$, where \sim means that the ratio of the quantities on either side tends to 1 as $n \rightarrow \infty$.]

Exercise 3. Textbook exercise A.4.6.

Exercise 4. Textbook exercise A.4.9.

Exercise 5. Textbook exercise A.4.25. [*Suggestion:* Write $1/x = 1/(a + (x - a))$.]

Exercise 6. Show that for $|x - 1| < 1$,

$$\ln x = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x-1)^n}{n}.$$

Therefore $\ln x$ is analytic at $a = 1$. [*Suggestion:* Take $a = 1$ in the previous exercise and integrate. Don't forget to evaluate the constant of integration!]