Intro to Abstract Mathematics — Assignment 5.3

Spring 2020 — Due February 28

Exercise 1. Reproduce the following expression in LaTeX:

$$f(z) = z^m e^{g(z)} \prod_{n=1}^{\infty} \left(1 - \frac{z}{a_n}\right) e^{\sum_{j=1}^{m_n} \frac{1}{j}\left(\frac{z}{a_n}\right)^j}.$$

Exercise 2. Reproduce the following equation in LaTeX:

$$\begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}^{-1} = \frac{1}{a_{11}a_{22} - a_{12}a_{21}} \begin{pmatrix} a_{22} & -a_{12} \\ -a_{21} & a_{11} \end{pmatrix}.$$

[*Suggestion:* Use the `matrix` environment.]

Exercise 3. Reproduce the following theorem statement in LaTeX:

Theorem 1 (Rank-Nullity Theorem)**.** *If $T : V \to W$ is a linear transformation of finite dimensional vector spaces, then*

$$\dim V = \dim \ker T + \dim \operatorname{im} T.$$

Exercise 4. Write a truth table in LaTeX to prove that $P \wedge (Q \wedge R) \cong (P \wedge Q) \wedge R$.