Exercise 3.1 MLE for the Bernoulli/ binomial model

$$\frac{d}{d\theta}p(D|\theta) = \frac{d}{d\theta}(\theta^{N_1}(1-\theta)^{N_0}) \tag{1}$$

$$= N_1\theta^{N_1-1}(1-\theta)^{N_0} - N_0\theta^{N_1}(1-\theta)^{N_0 1} \tag{2}$$

$$= \theta^{N_1-1}(1-\theta)^{N_0-1}(N_1(1-\theta) - N_0\theta) \tag{3}$$

$$= \theta^{N_1-1}(1-\theta)^{N_0-1}(N_1 - N\theta) \tag{4}$$

$$\therefore \theta_{\mathrm{MLE}} = \frac{N_1}{N} \tag{5}$$