

$$Q_1 = a^{p_b-1} \bmod n$$

Note

- Repeatedly compute

$$Q_i = ((Q_{i-1})^2 \bmod n) a^{p_b-i} \bmod n$$

$$\begin{aligned} \hookrightarrow i=2, \quad Q_2 &= Q_1^2 \cdot a^{p_b-2} \bmod n \\ &= a^{2p_b-1 + p_b-2} \bmod n \end{aligned}$$

$$\begin{aligned} & \left(\frac{m - (i-1)}{m} \right) \\ &= 1 - \frac{i-1}{m} \end{aligned}$$

$$k \approx 1.17 m^{1/2} \quad \text{if } m = 1024 = 2^{10}$$

$$k = 1.17 \sqrt{m} = 1.17 \times 2^5 = \underline{\underline{38}}$$