

$$\mathbb{F} \triangleleft \mathbb{1}^m = \frac{{}_{1+m}\mathbb{F} \xleftarrow{\mathfrak{A}} \mathbb{1}}{\begin{bmatrix} \mathbb{h} \times \mathfrak{d} \mathbb{h} \\ + \\ \mathbb{h} \times \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A} = \mathbb{h} \times \underbrace{\begin{bmatrix} \mathfrak{d} \mathbb{h} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A}}$$

$$\mathbb{F} \triangleleft \mathbb{1}^m = \frac{{}_m\mathbb{F} \xleftarrow{\mathfrak{A}} \mathbb{1}}{\begin{bmatrix} \mathbb{1} \mathbb{h} \\ + \\ \mathbb{1} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A} = 0}$$

$$\mathbb{F} \triangleleft \mathbb{1}^{\mathbb{N}} = \sum_m \mathbb{F} \triangleleft \mathbb{1}^m \in {}^{\mathbb{N}}\mathbb{K}$$

$$\begin{array}{ccc} \mathbb{F} \triangleleft \mathbb{1}^m & \xleftarrow{d_{m-1}} & \mathbb{F} \triangleleft \mathbb{1}^{m-1} \\ \downarrow \text{)} & & \downarrow \text{)} \\ \mathbb{F} \triangleleft \mathbb{1}^m & \xleftarrow{d_{m-1}} & \mathbb{F} \triangleleft \mathbb{1}^{m-1} \end{array}$$

$$\begin{bmatrix} \mathfrak{d} \mathbb{h} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A} \stackrel{\text{ML}}{=} \sum_{0 \leq j \leq m} (-1)^j \begin{bmatrix} \mathfrak{d} \mathbb{h} \\ + \\ \mathfrak{j} \mathbb{h} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A}$$

$$\binom{m+1}{-1} \begin{bmatrix} \mathfrak{d} \mathbb{h} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A} = \mathfrak{d} \mathbb{h} \times \begin{bmatrix} \mathbb{1} \mathbb{h} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A} + \binom{m+1}{-1} \begin{bmatrix} \mathfrak{d} \mathbb{h} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A} - \sum_{j \in m} (-1)^j \begin{bmatrix} \mathfrak{d} \mathbb{h} \\ + \\ \mathfrak{j} \mathbb{h} \times \mathfrak{j} \mathbb{h} \\ + \\ \mathfrak{m} \mathbb{h} \end{bmatrix} \mathfrak{A}$$

$$d \underbrace{\triangleleft \mathbb{1}}^{\mathfrak{A}} = \underbrace{\triangleleft \mathbb{1}}^{\mathfrak{A}} d$$

$$dd = 0$$

$$\tilde{1} = \mathbb{T}_h \triangleleft 1_{\mathbb{R} \text{ mod}}$$

$$\mathbb{h} \underline{\mathbb{h}} \times \underline{1} = \underline{\mathbb{h}} \times \underline{\mathbb{h}} 1 - \mathbb{h} \times \underline{\mathbb{h}} 1$$

$$\Rightarrow \mathbb{T}_h \triangleleft \tilde{1} \xleftarrow[\underbrace{\quad}]{j_m} \mathbb{T}_h \triangleleft \tilde{1}^{m+1}$$

$$\tilde{d}_m j_m = j_{m+1} d_{m+1} \Rightarrow j_{m+1} d_{m+1} d_m = \tilde{d}_m j_m d_m = \tilde{d}_m \tilde{d}_{m-1} j_{m-1} \equiv 0$$