(cat) Define function $cat$ so that it applies to a list of lists and produces their catenation. For example,

$$cat \begin{bmatrix} [0; 1; 2]; [nil]; [[3]]; [4; 5] \end{bmatrix} = [0; 1; 2; [3]; 4; 5]$$

§ I’m going to define $cat$ so it applies to all lists, not just lists of lists. But when applied to a list of lists, it will produce their catenation, as required. Let $i$ be an item, and let $s$ and $t$ be any strings. Then

$$cat [nil] = nil$$
$$cat [i] = i$$
$$cat [s; t] = cat [s] + cat [t]$$

Now let’s try it in the example.

$$cat \begin{bmatrix} [0; 1; 2]; [nil]; [[3]]; [4; 5] \end{bmatrix}$$

$$= cat \begin{bmatrix} [0; 1; 2] \end{bmatrix} + cat \begin{bmatrix} [nil] \end{bmatrix} + cat \begin{bmatrix} [[3]] \end{bmatrix} + cat \begin{bmatrix} [4; 5] \end{bmatrix}$$

$$= [0; 1; 2] + [nil] + [[3]] + [4; 5]$$

$$= [0; 1; 2; [3]; 4; 5]$$