

Length of Concatenation

LISTS_LENGTHCONCAT_4512036658964875

Proposition 0.1. $\text{length}(L ++ L') = \text{length}(L) + \text{length}(L')$ for all lists L, L' .

Proof by induction on L . Let L be a list.

Case $L = []$. Trivial.

Case $L = a :: L''$ for some object a and some list L'' . Take an object a and a list L'' such that $L = a :: L''$. Then $L'' \prec L$. Hence $\text{length}(L'' ++ L') = \text{length}(L'') + \text{length}(L')$ for every list L' . Thus $\text{length}(L ++ L') = \text{length}((a :: L'') ++ L') = \text{length}(a :: (L'' ++ L')) = \text{length}(L'' ++ L') + 1 = (\text{length}(L'') + \text{length}(L')) + 1 = (\text{length}(L'') + 1) + \text{length}(L') = \text{length}(a :: L'') + \text{length}(L') = \text{length}(L) + \text{length}(L')$ for every list L' . End. \square