

5.19 silly post Correspondence, SPCP in esch
pair the top string has the same length
as the bottom string. Show SPCP is
decidable.

Claim: $\{ \begin{pmatrix} x_i \\ y_i \end{pmatrix} \}$ SPCP can find solution iff $\exists \begin{pmatrix} x_i \\ y_i \end{pmatrix}$ s.t.
 $\text{length}(x_i) = \text{length}(y_i)$

If a solution exists, it will be in form $\begin{pmatrix} x_1 \\ y_1 \end{pmatrix}, \dots, \begin{pmatrix} x_n \\ y_n \end{pmatrix}$
For it to be correct, $\text{length}(x_i) = \text{length}(y_i)$
So there is one pair where lengths are equal
It follows that SPCP having a solution \rightarrow
 $\exists \begin{pmatrix} x_i \\ y_i \end{pmatrix}$ s.t. $\text{length}(x_i) = \text{length}(y_i)$

Time to prove reverse:

If $\exists \begin{pmatrix} x_i \\ y_i \end{pmatrix}$ s.t. $\text{length}(x_i) = \text{length}(y_i)$ we have a solution
 $\begin{pmatrix} x_i \\ y_i \end{pmatrix}$ therefore $\exists \begin{pmatrix} x_i \\ y_i \end{pmatrix}$ s.t. $\text{length}(x_i) = \text{length}(y_i) \rightarrow$
SPCP has a solution.

Therefore the claim is proven
Let TM M check this claim

M: Γ^m

1 If match pair found, ACCEPT
2 Otherwise REJECT