

6.19 Recall Post Correspondence Problem and the associated language PCP. Show that PCP is decidable relative to A_{TM} .

$$\{ \begin{matrix} t_i \\ b_i \end{matrix} \}$$

First we find A_{TM} to solve PCP

$T = \text{set of } t_1, \dots, t_n, B = \text{'}$

TM M : Input $\langle T, B \rangle$

1. Create a new unique string made up of $\{ \begin{matrix} t_i \\ b_i \end{matrix} \}$
2. concatenate the top and bottom
3. if top = bottom, Accept. Otherwise loop to 1

This may loop forever

Now we create another TM using the Oracle A_{TM}

TM F : Input $\langle T, B \rangle$

1. Run A_{TM} on $\langle M, T, B \rangle$
2. If A_{TM} accepts, ACCEPT. OTHERWISE REJECT

The Assistance of A_{TM} allows F to be decidable.