Machine M

$s_\nu \backslash x_\nu$	z_ν α	z_ν β	z_ν γ	$s_{\nu+1}$ α	$s_{\nu+1}$ β	$s_{\nu+1}$ γ
1	1	0	1	2	5	5
2	0	1	1	6	2	5
3	0	1	1	2	2	7
4	1	0	1	8	3	1
5	1	0	1	2	5	5
6	0	1	1	2	6	5
7	0	1	1	6	6	3
8	1	0	1	8	7	5

Machine Q

$s_\nu \backslash x_\nu$	z_ν α	z_ν β	$s_{\nu+1}$ α	$s_{\nu+1}$ β
1	0	1	3	4
2	1	1	1	2
3	0	0	4	4
4	1	0	2	3

(25) 1. The equivalence partition for the machine M is

$\hat{P} =$

and the transition table for the minimal form $\check{M}$ of the machine M is

$\check{M}$

$s_\nu \backslash x_\nu$	z_ν α	z_ν β	z_ν γ	$s_{\nu+1}$ α	$s_{\nu+1}$ β	$s_{\nu+1}$ γ

(10) 2. How many (n, p, q) machines are there which have at least one reflecting branch?

____

(10) 3. Using the skeleton matrix $[\tilde{Q}]$ of machine Q, determine how many paths of length less than or equal to 4 there are from state 1 to state 2.

$[\tilde{Q}] =$ # paths = ______________________

(10) 4. Suppose that in a minimal n state machine M, $|P_1| = u$. Then any two states can be distinguished by an input sequence of length at most ________ (this is the *pairwise diagnosing problem*).

(20) 5. Consider the proof that **TM** stepwise simulates **SR2** using the memory mapping $g(i, j) = (01^i01^j0, 1)$. Give the **TM** programs (as flowcharts) that simulate the **SR2** instructions $y > 0?$ and $y \leftarrow y - 1$.

(25) 6. The memory set of the Post machine **PM** is just Σ^*. To prove that **PM** simulates **SR2**, one could use the memory mapping $g(i, j) = 1^i01^j$. Assuming this g, give the **PM** program simulating the **SR2** instruction $x \leftarrow x + 1$. So I can understand your program, you will need to include a definition of **PM** and its instructions.