Question 1, HW -11, CpE 313, Fall 2004

actual direction	T	T	T	N	T	T	T	N	T	T	T	N	T
state	1	1	1	1	0	1	1	1	0	1	1	1	0
predicted direction	T	**_T_**	**_T_**	**_T_**	**_N_**	T	T	T	N	T	T	T	N
state	11	11	11	11	10	11	11	11	10	11	11	11	10
predicted direction	T	T	T	T	T	T	T	T	T	T	T	T	T

1) Rows filled above.

2) We will consider one "period" of predicted branch directions, i.e., the set of predictions that repeats itself. It is shown in italic bold underlined.

Mis-prediction rate for 1-bit counter = # of mis-predictions/# of predictions
$$= 2/4 = 50\%$$

3) Mis-prediction rate for 2-bit counter = # of mis-predictions/# of predictions
$$= ¼ = 25\%$$

Question 2, HW -11, CpE 313, Fall 2004

actual direction	T	N	T	N	T	N	T	N	T	N	T	N	T
state	1	1	0	1	0	1	0	1	0	1	0	1	0
predicted direction	T	**_T_**	**_N_**	T	N	T	N	T	N	T	N	T	N
state	11	11	10	11	10	11	10	11	10	11	10	11	10
predicted direction	T	T	T	T	T	T	T	T	T	T	T	T	T

1) Rows filled above.

2) Mis-prediction rate for 1-bit counter = # of mis-predictions/# of predictions
$$= 2/2 = 100\%$$

3) Mis-prediction rate for 2-bit counter = # of mis-predictions/# of predictions
$$= 1/2 = 50\%$$