

Let N_1 be the number of spins in the up state, then
(or down)

$$P(N_1 = n_1) = \frac{1}{2^N} \binom{N}{N_1}$$

$$P(N_1 = 0) = \frac{1}{2^N} \binom{N}{0} = \frac{1}{2^N}$$