Equal superposition

$$|\psi\rangle = \frac{1}{\sqrt{2}}|0\rangle + \frac{1}{\sqrt{2}}|1\rangle$$

$$= |+\rangle$$

$\text{Prob}\{+1\} = 1 \text{ (state } |+\rangle)$

$\text{Prob}\{-1\} = 0 \text{ (state } |-\rangle)$

Maximally mixed state

$$\rho = \frac{1}{2}|0\rangle\langle 0| + \frac{1}{2}|1\rangle\langle 1|$$

$$= \frac{1}{2}|+\rangle\langle +| + \frac{1}{2}|-\rangle\langle -|$$

$\text{Prob}\{+1\} = \frac{1}{2} \text{ (state } |+\rangle)$

$\text{Prob}\{-1\} = \frac{1}{2} \text{ (state } |-\rangle)$