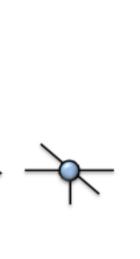
$$\exp\left(\frac{\beta\sigma_{z}\sigma_{z}}{2}\right) = \cosh\left(\frac{\beta}{2}\right)I + \sinh\left(\frac{\beta}{2}\right)\sigma_{z}\sigma_{z} \longrightarrow \phi$$

$$\downarrow^{i} \qquad = \frac{1}{i'} \qquad = \left(\cosh\left(\frac{\beta}{2}\right)\right)^{1/2} \delta_{i'}^{i} \qquad \downarrow^{i} \qquad = \frac{2}{i'} \qquad = \left(\sinh\left(\frac{\beta}{2}\right)\right)^{1/2} (\sigma_{z})_{i'}^{i}$$



(b)