Derivation

From eq(2),

$$P(\boldsymbol{y}) = N(\boldsymbol{y}|\boldsymbol{m}, \Phi_b)$$
$$= N(\boldsymbol{y}|\boldsymbol{m}, A\Psi A^T)$$
$$= \boldsymbol{m} + A * N(\boldsymbol{v}|\boldsymbol{0}, \Psi)$$

From eq(1),

$$P(\boldsymbol{x}|\boldsymbol{y}) = N(\boldsymbol{x}|\boldsymbol{y}, \Phi_w)$$
$$= N(\boldsymbol{x}|\boldsymbol{m} + A\boldsymbol{v}, AA^T)$$
$$= m + A * N(u|v, I)$$

$$\therefore \ \boldsymbol{y} = \boldsymbol{m} + A\boldsymbol{v}$$
$$\boldsymbol{x} = \boldsymbol{m} + A\boldsymbol{u}$$