(b)We first assume that $\exists x,y,z \in N$, satisfy $(P(x, y) \wedge P(z, y) \wedge P(x, z) \wedge \neg P(z, x))$ Then we get:

$$(y=x+1) \wedge (y=z+1) \wedge (z=x+1) \wedge (x \neq z+1)$$

However, its first three equations are contradictory, as $(y=x+1) \wedge (y=x+2)$is always false for $x,y,z \in N$, so this FOL model violates the formula $\Phi$

(c) We first assume that $\exists x,y,z \in P(N)$, satisfy $(P(x, y) \wedge P(z, y) \wedge P(x, z) \wedge \neg P(z, x))$

Then we get:

$$x \subseteq y, z \subseteq y, x \subseteq z, z \subsetneq x$$

So we can get $(x \subseteq z \subseteq y) \wedge (z \subsetneq x)$, it is obvious to be true. So $M3 \models \Phi$