Soluzioni gruppo 50 Esercitazione A.3.2:

1.

$$\begin{gathered}\forall p(Persona(p) \implies \exists t \text{ haTelefono}(p,t)) \\ \wedge \\ \forall z(Persona(z) \implies \neg Telefono(z)) \\ \wedge \\ \forall x,y(\text{ haTelefono}(x,y) \implies Persona(x) \wedge Telefono(y))\end{gathered} \tag{1}$$

2.

$$\begin{gathered}\forall p(Persona(p) \implies \exists n \text{ siChiama}(p,n)) \\ \wedge \\ \forall a \exists b(\text{ siChiama}(a,b) \implies \neg\exists \hat{b} \text{ siChiama(a,}\hat{b}) \wedge \hat{b} \neq b) \\ \wedge \\ \forall x(Persona(x) \implies \neg Stringa(x)) \\ \wedge \\ \forall z,y(\text{ siChiama(z,y)} \implies Persona(z) \wedge Stringa(y))\end{gathered} \tag{2}$$

3.

$$\begin{gathered}\forall d \exists a,b((lavora(d,a) \wedge lavora(d,b) \wedge a \neq b) \implies \\ \neg\exists c(lavora(d,c) \wedge c \neq a \wedge c \neq b))\end{gathered} \tag{3}$$

4.

$$\begin{gathered}\forall d(dipartimento(d) \implies \exists dir \text{ dirige}(d,dir)) \\ \wedge \\ \forall x,y(dirige(x,y) \implies dipartimento(x) \wedge direttore(y)) \\ \wedge \\ \forall z(direttore(z) \implies persona(z)) \\ \wedge \\ \forall \alpha(persona(\alpha) \implies \neg dipartimento(\alpha)) \\ \wedge \\ \forall \beta \exists \gamma(dirige(\beta,\gamma) \implies \neg\exists \pi dirige(\beta,\pi) \wedge \pi \neq \gamma)\end{gathered} \tag{4}$$