Ejercicios Práctico 4

1) azul $:$ Figura $\rightarrow$ Bool

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azul.(f, c, t ) = c == Azul
```

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rombo ~:~ Figura $\rightarrow$ Bool
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```
rombo.(f, c, t ) = f == Rombo
```

2) tam $:$ Figura $\rightarrow$ a

```
tam.(f, c, t ) = t
```

3)

a) $\langle \forall x \ : \ x \in_l xs \ : \ rojo.x \rangle$

b) $\langle \forall x \ : \ x \in_l xs \ : \ tam.x < 5 \rangle$

c) $\langle \forall x \ : \ x \in_l xs \wedge triangulo.x \ : \ rojo.x \rangle$

d) $\langle \exists x \ : \ x \in_l xs \wedge cuadrado.x \ : \ verde.x \rangle$

e) $\langle \forall x \ : \ x \in_l xs \wedge circulo.x \ : \ azul.x \wedge tam.x < 10 \rangle$

f) $\langle \forall x : x \in_l xs \wedge triangulo.x : \neg azul.x \rangle$

g) $\langle \forall x : x \in_l xs \wedge circulo.x : \neg amarillo.x \wedge \neg verde.x \rangle$

h) $\langle \exists x : cuadrado.x \wedge x \in_l xs : tam.x < 5 \rangle$

i) $\langle \forall x : x \in_l xs \wedge circulo.x \wedge rojo.x : \langle \exists y : y \in_l xs \wedge cuadrado.y : rojo.y \rangle \rangle$

5)

a)

propB.[] = True

propB.(x:xs) = tam.x $<$ 5 $\wedge$ propB.xs

```
propC.[] = True
propC.(x:xs )
    | triangulo.x = rojo.x && propC.xs
    | otherwise = propC.xs
```

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propD.[] = False
propD.(x:xs ) = cuadrado.x && verde.x  || propC.xs
```

```
propE.[] = True
propE.(x:xs )
    | circulo.x = azul.x && tam.x < 10 && propE.xs
    | otherwise = propE.xs
```

i)

```
propI.[] = True
propI.(x:xs ) =
```

7) Traducción a lenguaje natural:

a) Todo x en xs que no sea rojo o sea un triangulo tiene un tamaño mayor a 10

b) Existe una figura roja en xs y existe alguna figura que no es roja

c) Toda figura roja en xs es un cuadrado y tiene un tamaño mayor a 10

xs = [(Cuadrado,Rojo,11), (Triangulo,Azul,12)]

8)

a) $\langle \forall x : entero.x : par.x \vee impar.x \rangle$

b) $\langle \forall x : x \in_l xs : esCero.x \vee esUno.x \rangle$

c) $\langle \forall x : esUno.x \wedge x \in_l xs : \langle \exists y : y \in_l xs : esCero.y \rangle \rangle$

d) $\langle \exists x : x \in_l xs : esTrue.x \rangle$

e) $\#xs \geq 1 \implies xs \; !! \; 0 == 0$

f) $\langle \forall i, j : 0 \leq i < \#xs \wedge 0 \leq j < \#xs \wedge i == j : xs \; !! \; i == xs \; !! \; j \rangle$

g) $\langle \forall i, j : 0 \leq i < \#xs \wedge 0 \leq j < \#xs \wedge i \neq j : xs \; !! \; i \neq xs \; !! \; j \rangle$

h) $\langle \forall i : 0 \leq i < (\#xs - 1) : xs \; !! \; i > xs \; !! \; (i + 1) \rangle$

i) $\langle \forall i : 0 \leq i < \#xs \wedge i < \#ys : xs \; !! \; i == ys \; !! \; i \rangle$

j) $\langle \forall x : x \in_l xs : \#x \geq 1 \rangle$

9)

a) $\langle \exists x : hombre.x \wedge Papa.x : \langle \forall y : hombre.y : x \neq y \rangle \rangle$

b) $\langle \exists i : 0 \leq i < \#xs \wedge xs \; !! \; i == 0 : \langle \forall j : 0 \leq j < \#xs \wedge j \neq i : xs \; !! \; j \neq 0 \rangle \rangle$

c)

$$\langle \exists i : 0 \leq i < \#xs \wedge xs \; !! \; i == x : \langle \forall j : 0 \leq j < \#xs \wedge j \neq i : xs \; !! \; j \neq x \rangle \rangle$$

d)

$$\langle \exists i : 0 \leq i < \#xs \wedge xs \; !! \; i = cuadrado.x \wedge xs \; !! \; i = azul.x : \langle \forall j : 0 \leq j < \#xs \wedge j \neq i : \neg(xs \; !! \; i = cuadrado.x \wedge xs \; !! \; i = azul.x) \rangle \rangle$$