Answers to Exercises 34

Yet more Welsh affairs! Using the same translation manual as §34.3 – i.e.

'a' means *Angharad*
'b' means *Bryn*
'm' means *Mrs Jones*
'F' means … *speaks Welsh*
'G' means … *is a girl*
'L' means … *loves* …
'M' means … *is taller than* …

and where the domain of quantification again consists of human beings – we are to translate the following into $\mathbf{QL}^=$.

Throughout, of course, we are to use Russell's Theory of Descriptions: so, we render a sentence of the kind 'The *F* is *G*' into $\mathbf{QL}^=$ by corresponding wffs of one of the forms

(R) $\exists v((Fv \land \forall w(Fw \supset w = v)) \land Gv)$
(R′) $\exists v\forall w((Fw \equiv w = v) \land Gv)$

(R) could be rebracketed as: $\exists v(Fv \land (\forall w(Fw \supset w = v)) \land Gv))$, and (R′) as $\exists v(\forall w(Fw \equiv w = v) \land Gv)$. We give some alternative versions (with some Loglish mixes on the way!):

1. The Welsh speaker loves Mrs Jones.
   $\exists x((Fx \land \forall y(Fy \supset y = x)) \land Lxm)$
   $\exists x\forall y((Fy \equiv y = x) \land Lm)$

2. The girl who loves Angharad does not loves Bryn.
   $\exists x((\{Gx \land Lxa\} \land \forall y(\{Gy \land Lya\} \supset y = x)) \land \neg Lxb)$
   $\exists x\forall y((\{Gy \land Lya\} \equiv y = x) \land \neg Lxb)$

3. Angharad loves the girl who loves Bryn.
   $\exists x((\{Gx \land Lxb\} \land \forall y(\{Gy \land Lyb\} \supset y = x)) \land Lax)$
   $\exists x\forall y((\{Gy \land Lyb\} \equiv y = x) \land Lax)$

4. The Welsh speaker who loves Mrs Jones is either Angharad or Bryn.
   $\exists x((\{Fx \land Lxm\} \land \forall y(\{Fy \land Lym\} \supset y = x)) \land \{x = a \lor x = a\})$
   $\exists x\forall y((\{Fy \land Lym\} \equiv y = x) \land \{x = a \lor x = a\})$

5. Someone other than the girl who loves Bryn is taller than Angharad.
   $\exists x((\{Gx \land Lxb\} \land \forall y(\{Gy \land Lyb\} \supset y = x)) \land$ *Someone other than* x *is taller than* a)
   $\exists x((\{Gx \land Lxb\} \land \forall y(\{Gy \land Lyb\} \supset y = x)) \land \exists z(\neg z = x \land Mza))$
   $\exists x\forall y((\{Gy \land Lyb\} \equiv y = x) \land \exists z(\neg z = x \land Mza))$

6. The one who loves Angharad is the one she loves.
   $\exists x((Lxa \land \forall y(Lya \supset y = x)) \land$ x *is the one who* a *loves*)
   $\exists x((Lxa \land \forall y(Lya \supset y = x)) \land \exists z((Laz \land \forall w(Law \supset w = z)) \land z = x))$
   $\exists x\forall y((Lya \equiv y = x) \land \exists z\forall w((Law \equiv z = w) \land z = x))$

7. Only if she loves him does Bryn love the girl who speaks Welsh.
   $\exists x((\{Fx \land Gx\} \land \forall y(\{Fy \land Gy\} \supset y = x)) \land$ *Bryn loves* x *only if x loves Bryn*)
   $\exists x((\{Fx \land Gx\} \land \forall y(\{Fy \land Gy\} \supset y = x)) \land (Lbx \supset Lxb))$
   $\exists x\forall y((\{Fy \land Gy\} \equiv y = x) \land (Lbx \supset Lxb))$

8. The girl other than the girl who loves Bryn is Angharad.
   $\exists x((\{Gx \land Lxb\} \land \forall y(\{Gy \land Lyb\} \supset y = x)) \land$ *The girl other than* x *is* a)
   $\exists x((\{Gx \land Lxb\} \land \forall y(\{Gy \land Lyb\} \supset y = x)) \land$
   $\exists z((\{Gz \land \neg z = x\} \land \forall w(\{Gw \land \neg w = x\} \supset w = z)) \land z = a))$

9. The shortest Welsh speaker loves Bryn.

That is to say: the Welsh speaker who is shorter than all other Welsh speakers loves Bryn. Now consider the predicate '*x* is a Welsh Speaker and shorter than all other Welsh speakers', i.e $\{Fx \land \forall w((Fw \land \neg w = x) \supset Mwx)\}$. Plugging that into the usual RTD schemas, we get

$$\exists x((\{Fx \land \forall w((Fw \land \neg w = x) \supset Mwx)\} \\ \land \forall y(\{Fy \land \forall w((Fw \land \neg w = y) \supset Mwy)\} \supset y = x)) \land Lxb)$$

or, more simply

$$\exists x \forall y((\{Fy \land \forall w((Fw \land \neg w = y) \supset Mwy)\} \equiv y = x) \land Lxb)$$

10. The shortest Welsh speaker loves the tallest Welsh speaker.

$$\exists x((\{Fx \land \forall w((Fw \land \neg w = x) \supset Mwx)\} \\ \land \forall y(\{Fy \land \forall w((Fw \land \neg w = y) \supset Mwy)\} \supset y = x)) \land x \textit{ loves the tallest } F)$$

But similarly x *loves the tallest* F is

$$\exists v((\{Fv \land \forall w((Fw \land \neg w = v) \supset Mvw)\} \\ \land \forall z(\{Fz \land \forall w((Fw \land \neg w = z) \supset Mzw)\} \supset z = v)) \land Lxv)$$

Plugging the two together we get …

$$\exists x((\{Fx \land \forall w((Fw \land \neg w = x) \supset Mwx)\} \\ \land \forall y(\{Fy \land \forall w((Fw \land \neg w = y) \supset Mwy)\} \supset y = x)) \land \\ \exists v((\{Fv \land \forall w((Fw \land \neg w = v) \supset Mvw)\} \\ \land \forall z(\{Fz \land \forall w((Fw \land \neg w = z) \supset Mzw)\} \supset z = v)) \land Lxv))$$

And we are done!