Ex 34-36

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1 34

```
Let towerCat n i j k as = tower (n i j k )++ as

towerCat 0 i j k as
= tower 0 i j k ++ as
= []++ as
= as

towerCat n i j k as
= tower n i j k ++ as
= tower (n-1) i k j ++ [(i,j)] ++ tower (n-1) k j i ++ as
= towerCat (n-1) i k j ([(i,j)]: towerCat (n-1) k j i as)
```

2 35

```
sumdown 0 = sum(downFrom 0)= sum [] =0
sumdown n |n>0
= sum (downFrom n)
= sum (n: downFrom (n-1))
= n+sum(downFrom (n-1))
= n+sumdown(n-1)
```

3 36

tfold f k Empty = k
tfold f k (Node l a r) = f (tfold f k l) a (tfold f k r)
Dann ist g= tfold f k, falls
g empty = k
g (Node l a r) = f (g l) a (g r), also

$$g = tfold\ f\ k \iff g\ Empty = k \vee \forall l, a, r : g\ (Node\ l\ a\ r\ ) = f\ (g\ l\ )a\ (g\ r\ )$$

Dann:

$$\begin{aligned}
tfold\ f_2\ k_2\ .tfold\ f_1\ k_1 = tfold\ f_3\ k_3 \\
\Longleftrightarrow tfold f_2\ k_2\ .tfold f_1\ k_1 Empty = k_3 \\
\text{und } \forall l, a, r : (tfold\ f_2\ k_2\ .tfold\ f_1\ k_1)(Node\ l\ a\ r\ ) \\
= f_3(tfold\ f_2\ k_2\ .tfold\ f_1\ k_1 l)a(tfold\ f_2\ k_2\ .tfold\ f_1\ k_1 r) \\
\Longleftrightarrow f_2\ k_2\ k_1 = k_3 \\
\text{und } \forall l, a, r : (tfold\ f_2\ k_2\ (f_1\ (tfold\ f_1\ k_1\ l)a\ (tfold\ f_1\ k_1\ r))) \\
= f_3(tfold\ f_2\ k_2\ .tfold\ f_1\ k_1 l)a(tfold\ f_2\ k_2\ .tfold\ f_1\ k_1 r)
\end{aligned}$$

Da hänge ich beim Empty case fest, der Rest geht aber, glaube ich, einfach so durch...