

## Exercise 4.6 Bespoke sort

```

1 {a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w#}::Indices(position=independent).
2
3
4 def bespoke_sort (expr):
5
6     substitute      (expr,$ x^{a}          -> AAA01^{a}      $)
7     substitute      (expr,$ g_{a b}        -> AAA02_{a b}    $)
8     substitute      (expr,$ \Gamma_{a b c}  -> AAA03_{a b c}    $)
9
10    sort_product    (expr)
11
12    substitute      (expr,$ AAA01^{a}      -> x^{a}          $)
13    substitute      (expr,$ AAA02_{a b}    -> g_{a b}        $)
14    substitute      (expr,$ AAA03_{a b c}  -> \Gamma_{a b c} $)
15
16    return expr
17
18 # -----
19
20 expr := g_{a b} x^{a} x^{b} + \Gamma_{a b c} x^{a} x^{b} x^{c}. # cdb(ex-0406.100,expr)
21
22 expr = bespoke_sort (expr)                                     # cdb(ex-0406.101,expr)

```

$$\begin{aligned}
 p &= g_{ab}x^ax^b + \Gamma_{abc}x^ax^bx^c && (\text{ex-0406.100}) \\
 &= x^ax^bg_{ab} + x^ax^bx^c\Gamma_{abc} && (\text{ex-0406.101})
 \end{aligned}$$