## Exercise 4.4 Reformatting simple expressions

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 \{a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w\#\}:: \underline{Indices} (position=independent). 
     \nabla{#}::Derivative.
     def reformat (obj,scale):
         \{x^{a},A_{a},A_{a}\} # choose a sort order \{x^{a},A_{a}\} # choose a sort order
         foo = Ex(str(scale))
                                         # create a scale factor
10
         bah := @(foo) @(obj).
                                         # apply the scale factor, clears all fractions
11
12
                                         # only required if (bah) contains brackets
         distribute
                         (bah)
13
                         (bah)
         sort_product
         rename_dummies (bah)
15
         canonicalise (bah)
16
         factor_out (bah,$x^{a?}$)
17
18
         ans := @(bah) / @(foo). # undo previous scaling
19
         return ans
21
22
23
24
     # a messy unformatted expression
26
     expr := + (1/3) A_{a b} x^{a} x^{b}
27
             + (1/9) B_{e c} x^{c} x^{e}
28
             - (1/5) C_{p c} B_{d q} g^{c d} x^{p} x^{q}. # cdb (ex-0404.100, expr)
29
30
     # reformat terms and tidy fractions
31
32
     expr = reformat (expr,45)
                                                             # cdb(ex-0404.101,expr)
33
```

$$g = \frac{1}{3}A_{ab}x^a x^b + \frac{1}{9}B_{ec}x^c x^e - \frac{1}{5}C_{pc}B_{dq}g^{cd}x^p x^q$$
 (ex-0404.100)

$$= \frac{1}{45}x^a x^b \left(15A_{ab} + 5B_{ab} - 9B_{ca}C_{bd}g^{dc}\right)$$
 (ex-0404.101)