Exercise 4.4 Reformatting simple expressions

```
1
2   {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).
3
4   \nabla{#}::Derivative.
5
6   def reformat (obj,scale):
7
8       {x^{a},A_{a b},B_{a b},C_{a b},g^{a b}}::SortOrder.  # choose a sort order
9
10      foo  = Ex(str(scale))          # create a scale factor
11      bah := @(foo) @(obj).          # apply the scale factor, clears all fractions
12
13      distribute     (bah)           # only required if (bah) contains brackets
14      sort_product   (bah)
15      rename_dummies (bah)
16      canonicalise   (bah)
17      factor_out     (bah,$x^{a?}$)
18
19      ans := @(bah) / @(foo).        # undo previous scaling
20
21      return ans
22
23  # ------------------------------------------------------------------
24
25  # a messy unformatted expression
26
27  expr := + (1/3) A_{a b} x^{a} x^{b}
28          + (1/9) B_{e c} x^{c} x^{e}
29          - (1/5) C_{p c} B_{d q} g^{c d} x^{p} x^{q}.  # cdb (ex-0404.100,expr)
30
31  # reformat terms and tidy fractions
32
33  expr = reformat (expr,45)                              # cdb(ex-0404.101,expr)
```

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

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