Example 8 Importing and exporting Cadabra expressions

```
\{a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u\#\}::Indices(position=independent).
     def create (file_name):
         import json, io, os, errno
         try:
             os.remove(file_name)
                                                 # delete the file if it exsists
             with open(file_name, 'w'): pass
                                                 # create an empty file
         except OSError as e:
                                                  # errno.ENOENT = no such file or directory
             if e.errno == errno.ENOENT:
10
                with open(file_name, 'w'): pass # create an empty file
11
             else:
12
                                                  # report an exception
                 raise
13
14
         # Create and save an empty dict
15
         data_out = {}
16
         with io.open(os.getcwd() + '/' + file_name, 'w', encoding='utf-8') as out_file:
17
             out_file.write(json.dumps(data_out,
18
                                        indent=2,
19
                                        sort_keys=True,
20
                                        separators=(',', ': '),
21
                                        ensure_ascii=False)+'\n')
22
23
     def put (key_name,object,file_name):
24
         import json, io, os
25
26
         # Read the current dict
27
         with io.open(os.getcwd() + '/' + file_name) as inp_file:
28
             data_out = json.load(inp_file)
29
30
         # Add a new entry to the dict
31
         data_out[key_name] = object.input_form()
32
33
         # Save the updated dict
34
         with io.open(os.getcwd() + '/' + file_name, 'w', encoding='utf-8') as out_file:
35
             out_file.write(json.dumps(data_out,
36
```

```
indent=2,
37
                                     sort_keys=True,
38
                                     separators=(',', ': '),
39
                                     ensure_ascii=False)+'\n')
40
41
    def get (key_name,file_name):
42
        import json, io, os
43
44
        # Read the current dict
45
        with io.open(os.getcwd() + '/' + file_name) as inp_file:
46
            data_inp = json.load(inp_file)
47
48
        # Return one entry from the dict
49
        return Ex (data_inp[key_name])
51
    lib_name = 'example-08.json'
52
53
    create (lib_name)
54
55
    \nabla{#}::Derivative.
57
    gab := g_{a b} - 1/3 x^{c} x^{d} R_{a c b d}
58
                  - 1/6 x^{c} x^{d} x^{e} \lambda_{c}^{c} x^{d} .
                                                                                  # cdb (ex-08-02.101,gab)
59
60
    iab := g^{a} b + 1/3 x^{c} x^{d} g^{a} e g^{b} R_{c} e d f
61
                  63
    put ('g_ab',gab,lib_name)
64
    put ('g^ab',iab,lib_name)
65
66
                                                     # cdb (ex-08-02.103,foo)
    foo = get ('g_ab',lib_name)
67
    bah = get ('g^ab',lib_name)
                                                     # cdb (ex-08-02.104,bah)
69
    tmp := @(gab) - @(foo).
                                                     \# cdb (ex-08-02.105,tmp)
70
    tmp := @(iab) - @(bah).
                                                     \# cdb (ex-08-02.106,tmp)
```

$$g_{ab}(x) = g_{ab} - \frac{1}{3}x^{c}x^{d}R_{acbd} - \frac{1}{6}x^{c}x^{d}x^{e}\nabla_{c}R_{adbe}$$
 (ex-08-02.101)

$$g^{ab}(x) = g^{ab} + \frac{1}{3}x^c x^d g^{ae} g^{bf} R_{cedf} + \frac{1}{6}x^c x^d x^e g^{af} g^{bg} \nabla_c R_{dfeg}$$
 (ex-08-02.102)

$$\bar{g}_{ab}(x) = g_{ab} - \frac{1}{3}x^c x^d R_{acbd} - \frac{1}{6}x^c x^d x^e \nabla_c R_{adbe}$$
 (ex-08-02.103)

$$\bar{g}^{ab}(x) = g^{ab} + \frac{1}{3}x^c x^d g^{ae} g^{bf} R_{cedf} + \frac{1}{6}x^c x^d x^e g^{af} g^{bg} \nabla_c R_{dfeg} \tag{ex-08-02.104}$$

$$g_{ab}(x) - \bar{g}_{ab}(x) = 0 \tag{ex-08-02.105}$$

$$g^{ab}(x) - \bar{g}^{ab}(x) = 0 \tag{ex-08-02.106}$$