Exercise 1.1 Verify symmetry of $\Gamma^a{}_{bc}$

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1    {a,b,c,d,e,f,h,i,j,k,l,m,n,o,p,q,r,s,t,u#}::Indices.
2
3    g_{a b}::Metric.
4
5    \partial{#}::PartialDerivative.
6
7    Gamma := \Gamma^{a}_{b c} -> (1/2) g^{a d} (  \partial_{b}{g_{d c}}
8                                                + \partial_{c}{g_{b d}}
9                                                - \partial_{d}{g_{b c}} ).
10
11   diff := \Gamma^{a}_{b c} - \Gamma^{a}_{c b}.    # cdb (ex-0101.101,diff)
12
13   substitute    (diff, Gamma)                     # cdb (ex-0101.102,diff)
14   distribute    (diff)                            # cdb (ex-0101.103,diff)
15   canonicalise  (diff)                            # cdb (ex-0101.104,diff)
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$$\Gamma^a{}_{bc} - \Gamma^a{}_{cb} = \frac{1}{2} g^{ad} \left(\partial_b g_{dc} + \partial_c g_{bd} - \partial_d g_{bc} \right) - \frac{1}{2} g^{ad} \left(\partial_c g_{db} + \partial_b g_{cd} - \partial_d g_{cb} \right)$$

$$= \frac{1}{2} g^{ad} \partial_b g_{dc} + \frac{1}{2} g^{ad} \partial_c g_{bd} - \frac{1}{2} g^{ad} \partial_d g_{bc} - \frac{1}{2} g^{ad} \partial_c g_{db} - \frac{1}{2} g^{ad} \partial_b g_{cd} + \frac{1}{2} g^{ad} \partial_d g_{cb}$$

$$= 0$$