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

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{a,b,c,d,e,f,h,i,j,k,l,m,n,o,p,q,r,s,t,u#}::Indices.

g_{a b}::Metric.

\partial{#}::PartialDerivative.

Gamma := \Gamma^{a}_{b c} -> (1/2) g^{a d} (  \partial_{b}{g_{d c}}
                                            + \partial_{c}{g_{b d}}
                                            - \partial_{d}{g_{b c}} ).

diff := \Gamma^{a}_{b c} - \Gamma^{a}_{c b}.   # cdb (ex-0101.101,diff)

substitute    (diff, Gamma)                    # cdb (ex-0101.102,diff)
distribute    (diff)                           # cdb (ex-0101.103,diff)
canonicalise  (diff)                           # cdb (ex-0101.104,diff)
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$$
\begin{aligned}
\Gamma^a{}_{bc} - \Gamma^a{}_{cb} &= \frac{1}{2} g^{ad} \left(\partial_b g_{dc} + \partial_c g_{bd} - \partial_d g_{bc}\right) - \frac{1}{2} g^{ad} \left(\partial_c g_{db} + \partial_b g_{cd} - \partial_d g_{cb}\right) \\
&= \frac{1}{2} g^{ad}\partial_b g_{dc} + \frac{1}{2} g^{ad}\partial_c g_{bd} - \frac{1}{2} g^{ad}\partial_d g_{bc} - \frac{1}{2} g^{ad}\partial_c g_{db} - \frac{1}{2} g^{ad}\partial_b g_{cd} + \frac{1}{2} g^{ad}\partial_d g_{cb} \\
&= 0
\end{aligned}
$$