1 HGT scenarios: four species and five genes

1.1 Possible scenarios

There are only two topologies for a four-species tree:

1.2 Colored-orthology graphs

1.3 Coloring the scenarios

1.4 How to identify HGT and correct the orthology graph

Let T be a tree with $L_T = \{g_1, g_2, g_3, g_4, g_5\}$ which correspond to four species A, B, C and D, and say that g_1 and g_2 are in the same species, implying that one of them was acquired via HGT.
How to correct the orthology graph of T:

1. Identify the HGT donor (h) and receptor (h'):
   - Let G_1 and G_2 be the sets of four genes such that $\{g_1, g_2, h\}$ is a subset.
   - Generate the colored orthology graphs for S_1 and S_2 and add them to generate a five-vertex graph with two colors.
   - Identify the bidirectional edges of g_1 and g_2.
   - Choose as h', the vertex which has a bi-colored and bidirectional edge.
   - *Choose as h, the other vertex of this bi-colored and bidirectional edge.*
2. Delete h' and its edges from the five-vertex graph.
3. Complete the unidirectional edges to bidirectional edges.