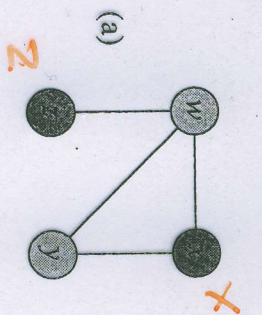


Figure 34.16 The widget used in reducing the vertex-cover problem to the hamiltonian-cycle problem. An edge (u, v) of graph G corresponds to widget W_{uv} in the graph G' created in the reduction. (a) The widget, with individual vertices labeled. (b)–(d) The shaded paths are the only possible ones through the widget that include all vertices, assuming that the only connections from the widget to the remainder of G' are through vertices $[u, v, 1]$, $[u, v, 6]$, $[v, u, 1]$, and $[v, u, 6]$.



$$N(w) = \{x, y, z\}$$

$$N(x) = \{w, y\}$$

$$N(y) = \{x, w\}$$

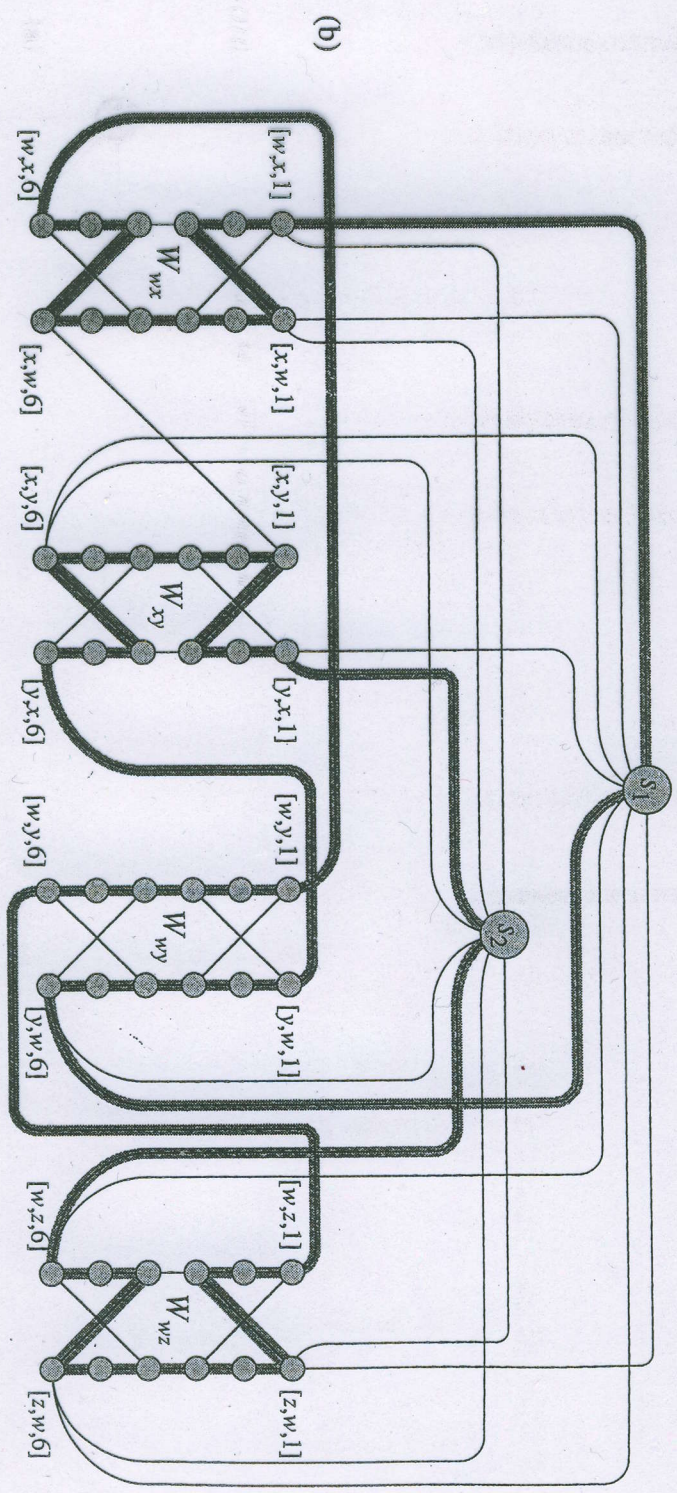


Figure 34.17 The reduction of an instance of the vertex-cover problem to an instance of the hamiltonian-cycle problem. (a) An undirected graph G with a vertex cover of size 2, consisting of the lightly shaded vertices w and y . (b) The undirected graph G' produced by the reduction, with the hamiltonian path corresponding to the vertex cover shaded. The vertex cover $\{w, y\}$ corresponds to edges $(s_1, [w, x, 1])$ and $(s_2, [y, x, 1])$ appearing in the hamiltonian cycle.