CSI 35: zyBooks sections 13.4 and 13.5 practice, answers

1. a path (no edges, no vertices repetitions): <1, 2, 4, 5>
a cycle (at least 1 long, no edges, no vertices repetitions): <1, 2, 4, 5, 1>
a trail (no edges repeating, but vertices may repeat): <1, 2, 4, 5, 1, 4> or <1, 2, 4, 5, 3, 4>
a circuit (no edges repeating, but vertices may repeat): <1, 2, 4, 5, 3, 4, 1>

2. 3 connected components ({a,b,c}, {e,d,f,g,} and {h,i,j,k,l})

3. $\delta(G) = 3$ (min degree of a vertex in the graph G), hence $k(G) \leq 3$ and $\lambda(G) \leq 3$.
edge connectivity: it doesn't seem possible to remove 1 or 2 edges to "disconnect" the graph, however, if the edges {d,3}, {c,4} and {b,1} are removed then the graph becomes disconnected, this makes $\lambda(G) = 3$
vertex connectivity: $k(G) = 3$ (for example, {1,3,c} can be removed, or {{b,c,d},… }

4. a cut-edge (bridge): {a,b}, or {4,5}, …
a cut-vertex (articulation point): b, or 4, …

5. complete graphs do not have cut-vertices, and $k(K_n) = n-1$ as you see below
$k(K_1) = 0$, $k(K_2) = 1$, $k(K_3) = 2$, $k(K_4) = 3$, $k(K_5) = 4$

6. yes it is, every pair of vertices has a path connecting them.

7. they are not, because G has a cycle of length 5: <g, c, d, e, f, g> and graph H doesn't have a cycle of length 5.
same with cycle of length 3: graph G has cycles of length 3: <g,h,f> and <b,c,d>, but graph H does not.