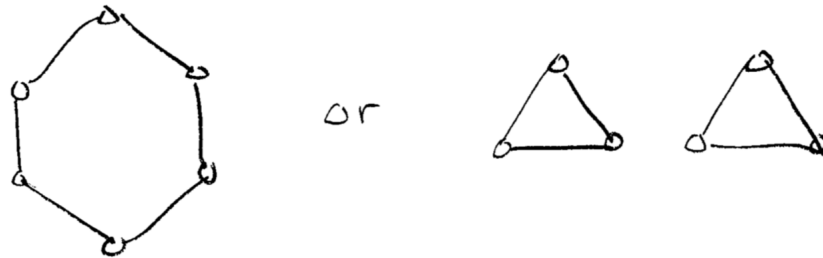**1. Degrees.** Every graph in this problem has 6 vertices.

(a) Draw a graph with degrees $2, 2, 2, 2, 2, 2$.

(b) Draw a graph with degrees $1, 1, 2, 2, 2, 2$.
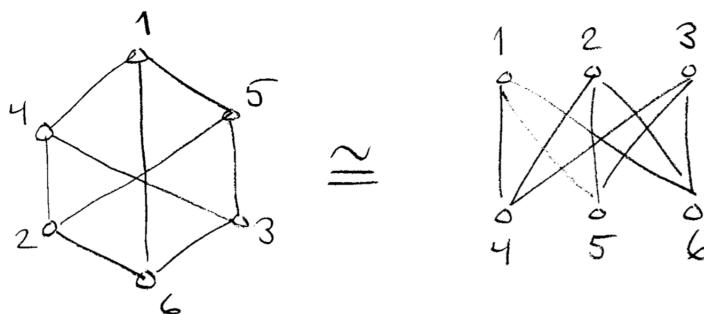

(c) Explain why there is no graph with degrees $1, 1, 1, 2, 2, 2$.

Proof. The degree sum of a graph is always even (because it equals twice the number of edges), but $1 + 1 + 1 + 2 + 2 + 2 = 9$ is an odd number. ∎

2. Isomorphism.

(a) Prove that the following graphs are isomorphic.

Observe that the labelings match:

(b) Prove that the following graphs are **not** isomorphic.

The degrees are not the same. For example the right graph has a vertex of degree 4 but the left graph does not:

(c) Draw **two non-isomorphic trees**, each with 4 vertices.

Here they are: