▶ **Problem 9.2-12 (b)**

Does there exist a graph G with 28 edges and 12 vertices, each of degree 3 or 6?

Solution. Suppose that the graph $G = (V, E)$ has a vertices of degree 3 and b vertices of degree 6. Then,

$$\sum_{v \in V} \deg v = 3a + 6b = 56 = 2|E|$$

and

$$a + b = 12.$$

These equations implies $a = \frac{16}{3}$ and $b = \frac{20}{3}$. However, this is impossible since a and b must be integers. Thus, there exists no such a graph. □