Garey & Johnson, *Computers and Intractability*, from appendix A.

[ND17] MINIMUM CUT INTO BOUNDED SETS

INSTANCE: Graph $G = (V, E)$, weight $w(e) \in Z^+$ for each $e \in E$, specified vertices $s, t \in V$, positive integer $B \leqslant |V|$, positive integer K.

QUESTION: Is there a partition of V into disjoint sets V_1 and V_2 such that $s \in V_1$, $t \in V_2$, $|V_1| \leqslant B$, $|V_2| \leqslant B$, and such that the sum of the weights of the edges from E that have one endpoint in V_1 and one endpoint in V_2 is no more than K?

Comment: Remains NP-complete for $B = |V|/2$ and $w(e) = 1$ for all $e \in E$...

[GT11] PARTITION INTO TRIANGLES

INSTANCE: Graph $G = (V, E)$, with $|V| = 3q$ for some integer q.

QUESTION: Can the vertices of G be partitioned into q disjoint sets $V_1, V_2, \ldots, V_q$, each containing exactly 3 vertices, such that for each $V_i = \{u_i, v_i, w_i\}$, $1 \leqslant i \leqslant q$, all the of the edges $\{u_i, v_i\}$, $\{u_i, w_i\}$, and $\{v_i, w_i\}$ belong to E?

[GT19] CLIQUE

INSTANCE: Graph $G = (V, E)$, positive integer $K \leqslant |V|$.

QUESTION: Does G contain a clique of size K or more, i.e., a subset $V' \subseteq V$ with $|V'| \geqslant K$ such that every two vertices in V' are joined by an edge in E?

Comment: Solvable in polynomial time for graphs obeying any fixed degree bound d...

[SP18] EXPECTED COMPONENT SUM

INSTANCE: Collection C of m-dimensional vectors $v = (v_1, v_2, \ldots, v_m)$ with non-negative integer entries, positive integers K and B.

QUESTION: Is there a partition of C into disjoint sets $C_1, C_2, \ldots, C_K$ such that

$$\sum_{i=1}^{K} \max_{1 \leqslant j \leqslant m} \left[\sum_{v \in C_i} v_j \right] \geqslant B$$

?