the net appears infinitely often in σ. A Petri net (N, M_0) is said to be an *unconditionally fair net* if every firing sequence σ from M in $R(M_0)$ is unconditionally fair. There are some relationships between these two types of fairness. For example, every B-fair net is an unconditionally-fair net and every bounded unconditionally-fair net is a B-fair net [187].

Example 3.6: The net shown in Fig. 3.4(h) is a B-fair net as well as an unconditionally fair net. The net shown in Fig. 3.4(d) is neither a B-fair net nor an unconditionally fair net since t_3 and t_4 will not appear in an infinite firing sequence $\sigma = \langle t_2\ t_1\ t_2\ t_1 \ldots \rangle$. The unbounded net shown in Fig. 3.4(c) is an unconditionally fair net but not a B-fair net, since there is no bound on the number of times that t_2 can fire without firing the others when the number of tokens in p_2 is unbounded.

Exercise 3.4. Determine whether each of the eight nets shown in Fig.3.4 is B-fair (BF) or not (non-BF), and unconditionally-fair (UF) or not (non-UF).

Answer: In Fig.3.4 (a) = non-BF, non-UF; (b) = non-BF, non-UF;
(c) = non-BF, UF; (d) = non-BF, non-UF; (e) = non-BF, non-UF;
(f) = non-BF, non-UF; (g) = BF, UF; (h) = BF, UF.

Note that a bounded net can be BF or non-BF; and that a BF-net can be bounded or unbounded. For example, delete t_1 from the net shown in Fig.3.4(a), we have an unbounded BF net.

The requirement for unconditional fairness is too strong in many cases. Thus we relax the unconditional fairness condition and define the following weaker fairness concepts, where all finite firing sequences are defined to be fair. An infinite firing sequence σ is said to be *strongly fair* if each transition enabled infinitely often, fires infinitely often in σ. An infinite firing sequence σ is said to be *weakly fair* if each transition enabled continuously from some point on, will eventually fire in σ. We can apply these fairness