# Approximation Algorithms

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#### 1. Bin-Packing

(a) An asymptotic PTAS.

#### 2. Scheduling with unrelated parallel machines.

- (i) Restricted bin-packing.
- (ii) Reduction from makespan to Restricted binpacking.

#### 3. LP-based approaches

- (a) Foundations of Duality through examples.
- (b) Weak Duality, Strong Duality, Complementary slackness.
- (c) Min-Max relations and LP-duality through Maximum Flow.
- (d) LP rounding and primal dual schema.
- (e) Integrality gap.