0-1 Knapsack: *Depth First* Traversal of State Space Tree with Branch-and-Bound Pruning

**Capacity W = 6 lb**

**item 1**

- **$10**
  - 1 lb

**item 2**

- **$18**
  - 2 lb

**item 3**

- **$32**
  - 4 lb

**item 4**

- **$14**
  - 2 lb

Nodes are numbered in the order they are visited.

The maximum profit is $50, and is obtained by excluding item 1 and taking items 2 and 3. (Item 4 is also excluded.)
0-1 Knapsack: *Breadth First* Traversal of State Space Tree with Branch-and-Bound Pruning

Capacity $W = 6$ lb

**item 1**

$10$

$1$ lb

**item 2**

$18$

$2$ lb

**item 3**

$32$

$4$ lb

**item 4**

$14$

$2$ lb

The maximum profit is $50, and is obtained by excluding item 1 and taking items 2 and 3. (Item 4 is also excluded.)

Nodes are numbered in the order they are visited.
0-1 Knapsack: *Best First* Traversal of State Space Tree with Branch-and-Bound Pruning

Capacity $W = 6$ lb

**item 1**

$10$

1 lb

**item 2**

$18$

2 lb

**item 3**

$32$

4 lb

**item 4**

$14$

2 lb

---

Nodes are potentially seen twice.

The triplet of numbers in each node is computed when its PARENT is expanded.

The node is then placed in a priority queue if it's promising.

The nodes are dequeued in the order 1,…,8 shown, according to which has the highest potential profit of currently enqueued nodes. If a node is still promising, its children are computed and enqueued.

Nodes numbered (3) (5) are computed when their parents are expanded, but do not get enqueued.