0/1 Knapsack Problem

Recursion

capacity
$m = 5$ $P = \{6, 5, 3, 8\}$

$n = 4$ $w = \{1, 2, 1, 2\}$

$x = \{ x_1\ x_2\ x_3\ x_4 \}$

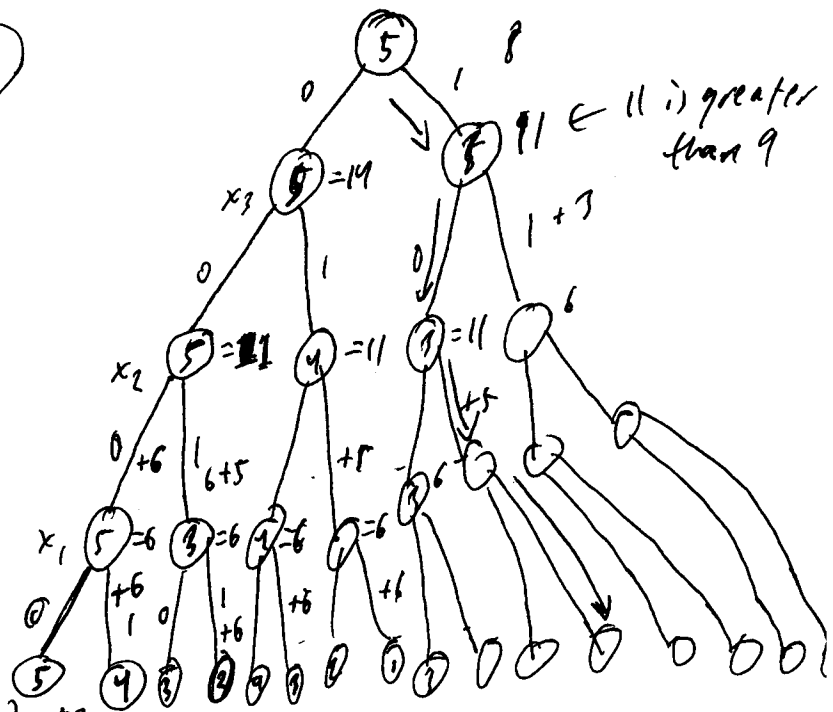
$m = 5$ P | - | 6 | 5 | 3 | 8 |
0 1 2 3 4

$n = 4$ w | - | 1 | 2 | 1 | 2 |
0 1 2 3 4

- Draw Tree! $2^4 = 2^n$

0 0 0 0
0 0 0 1
1 0 0 0
⋮
16 possibilities

$x_4 \leftarrow$ 19 or 14? 19!




```
int knap(int n, int m){
    if(n==0 || m==0){
        return 0;
    }
    if(w[n] <= m){
        int not_included = knap(n-1, m);
        int included = knap(n-1, m-w[n])+p[n];
        return (not_included > included?
            not_included: included);
    }else{
        return knap(n-1, m);
    }
}
```

$m - w_{x_1} = 4$

$5 - 1$

$P_{x_1} + 0 = 6$

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