Goal

- Today we will be covering Complete Search.
    1. Generating all subsets.
    2. Generating all permutations.

Resources

Generating Subsets

- https://usaco.guide/CPH.pdf#page=57
    - Read through the explanation given, it is very good.
    - You should know the two approaches:
        1. Recursion
        2. Bitmasking
- https://www.youtube.com/watch?v=Y85dfkCSlP8
    - Just watch it for the visuals.

Generating Permutations

- https://usaco.guide/CPH.pdf#page=59
    - Read through the explanation given, it is very good.
    - You should know the two approaches:
        1. Recursion
        2. `next_permutation()`
- https://www.youtube.com/watch?v=Nabbpl7y4Lo&t=50s
    - Just watch it for the visuals.

Problems

Generating Subsets

1. Given an integer n and n distinct integers.
    - Print all subsets of the integers.
    - Each subset should be printed on a new line in the following format:
        - `-> a1 a2 . . . an`
    - Solve this using the recursive approach.
    - sample_input

    ```
    3
    1 2 3
    ```

    - sample_output

    ```
    ->
    -> 3
    ```

```
-> 2
-> 2 3
-> 1
-> 1 3
-> 1 2
-> 1 2 3
```

2. Given an integer n and n distinct integers.
   - Print all subsets of the integers.
   - Each subset should be printed on a new line in the following format:
     - `-> a1 a2 . . . an`
   - Solve this using the bitmask approach.
   - sample_input

```
3
1 2 3
```

   - sample_output

```
->
-> 3
-> 2
-> 2 3
-> 1
-> 1 3
-> 1 2
-> 1 2 3
```

3. https://usaco.org/index.php?page=viewproblem2&cpid=1276
   - Solve this using recursion.
4. https://usaco.org/index.php?page=viewproblem2&cpid=1276
   - Solve this using bitmasking.

Generating Permutations

1. Given an integer n and n integers.
   - Print all permutations of the integers.
   - Each permutation should be printed on a new line in the following format:
     - `-> a1 a2 . . . an`
   - Solve this using the recursive approach.
   - sample_input

```
3
1 2 3
```

   - sample_output

```
-> 1 2 3
-> 1 3 2
-> 2 1 3
-> 2 3 1
-> 3 1 2
-> 3 2 1
```

2. Given an integer n and n integers.
   - Print all permutations of the integers.
   - Each permutation should be printed on a new line in the following format:
     - `-> a1 a2 . . . an`
   - Solve this using the built in function provided in the STL.
   - sample_input

   ```
   3
   1 2 3
   ```

   - sample_output

   ```
   -> 1 2 3
   -> 1 3 2
   -> 2 1 3
   -> 2 3 1
   -> 3 1 2
   -> 3 2 1
   ```

3. https://usaco.org/index.php?page=viewproblem2&cpid=965
   - Solve this using recursion.
4. https://usaco.org/index.php?page=viewproblem2&cpid=965
   - Solve this using the built in function provided in the STL.