Sequences
Announcements
Lists

['Demo']
Ranges
The Range Type

A range is a sequence of consecutive integers.*

..., -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, ...

Length: ending value - starting value

Element selection: starting value + index

>>> list(range(-2, 2))  # List constructor
[-2, -1, 0, 1]

>>> list(range(4))  # Range with a 0 starting value
[0, 1, 2, 3]

* Ranges can actually represent more general integer sequences.
List Comprehensions
List Comprehensions

[<map exp> for <name> in <iter exp> if <filter exp>]

Short version: [<map exp> for <name> in <iter exp>]
Example: Two Lists

Given these two related lists of the same length:

\[xs = \text{range}(-10, 11)\]
\[ys = [x^2 - 2x + 1 \text{ for } x \text{ in } xs]\]

Write a list comprehension that evaluates to:

A list of all the x values (from xs) for which the corresponding y (from ys) is below 10.

```python
>>> list(xs)
[-10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10]

>>> ys
[121, 100, 81, 64, 49, 36, 25, 16, 9, 4, 1, 0, 1, 4, 9, 16, 25, 36, 49, 64, 81]

>>> xs_where_y_is_below_10
[-2, -1, 0, 1, 2, 3, 4]
```
Example: Promoted
Implement **promoted**, which takes a sequence `s` and a one-argument function `f`. It returns a list with the same elements as `s`, but with all elements `e` for which `f(e)` is a true value ordered first. Among those placed first and those placed after, the order stays the same.

```python
def promoted(s, f):
    """Return a list with the same elements as s, but with all elements e for which f(e) is a true value placed first."

    >>> promoted(range(10), odd)  # odds in front
    [1, 3, 5, 7, 9, 0, 2, 4, 6, 8]
    """
    return [e for e in s if f(e)] + [e for e in s if not f(e)]
```
Example: Twenty-One
Twenty-One Rules

Two players alternate turns, on which they can add 1, 2, or 3 to the current total

The total starts at 0

The game end whenever the total is 21 or more

The last player to add to the total loses

At the start of your turn, this is bad

Some states are good; some are bad

21+ ← 20 ← 18 ← 17

(Demo)