Hints for *HyperMines*

Nested iteration

One of the difficulties in *HyperMines* is arbitrary-depth iteration. In *Mines*, you could write the following:

`python for r in range(nrows): for c in range(ncols): if (some condition on r, c): # Do something with (r, c)`

In 3 dimensions, you could imagine generalizing it to the following:

`python for x in range(width): for y in range(height): for z in range(depth): if (some condition on x, y, z): # Do something with (x, y, z)`

But this won't work for *HyperMines* (do you see why?). Instead, can you write a recursive function?

Neighbors

In line with the previous tip, how can you write an `nd_neighbors` function that enumerates all neighbors of a given point? The following auxiliary function template might be useful:

```python def nd_product(sequences): """Produce the Cartesian product of sequences.

```
Arguments:
   sequences (list): Sequences to compute the product of

Returns:
   A list of tuples

>>> nd_product(((1, 2, 3), ("a", "b")))
[(1, 'a'), (1, 'b'), (2, 'a'), (2, 'b'), (3, 'a'), (3, 'b')]
"""
```

```

Once you have the `nd_product` function, how can you use it to enumerate all neighbors of a point? It could be helpful to consider the 2-dimensional case first, then the 3-dimensional one, etc.

Suggested functions

Here is a list of useful auxilliary function that the reference solution uses. If you use any of them, remember to add your own doctests!

``` python def nd*get(nd*array, coords): """Get element at coords in nd_array.

```
Arguments:
   nd_array (list): N-dimensional input array
   coords (tuple): Coordinates of interest

Returns:
   An array element
"""
```

```

``` python def nd*set(nd*array, coords, value): """Set element at coords in nd_array.

```
Arguments:
   nd_array (list): N-dimensional input array
   coords (tuple): Coordinates of interest
   value: Value to put at coords
"""
```

```

``` python def nd_neighbors(game, coords): """Produce all neighbors of coords in game.
```

```
Arguments:
   game (dict): Game state
   coords (tuple): Reference point

Returns:
   An iterable of coordinates

>>> game = {"dimensions": [2, 4, 2],
...         "board": [[[3, '.'], [3, 3], [1, 1], [0, 0]],
...                   [['.', 3], [3, '.'], [1, 1], [0, 0]]],
...         "mask": [[[False, False], [False, True], [False, False], [False, False]],
...                  [[False, False], [False, False], [False, False], [False, False]]]}
>>> sorted(nd_neighbors(game, (1, 2, 0)))
[(0, 1, 0), (0, 1, 1),
 (0, 2, 0), (0, 2, 1),
 (0, 3, 0), (0, 3, 1),
 (1, 1, 0), (1, 1, 1),
 (1, 2, 0), (1, 2, 1),
 (1, 3, 0), (1, 3, 1)]
"""
```

```

```` python def nd_mkboard(dims, filler): """Create a board with dimensions dims, and fill it with filler.

```
Arguments:
   dims (list): List of board dimensions
   filler (Any): Value to initialize the board with

Returns:
   A len(dims)-dimensional array

>>> nd_mkboard((1, 3, 2), 42)
[[[42, 42], [42, 42], [42, 42]]]
"""
```

````

```` python def nd*game*status(game): """Compute game status.

```
Return one of "ongoing", "victory", or "defeat".
"""
```

````
````