02157 Functional programming

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Nov. 14, Nov. 22 , 2023

# Exercises: Week 12

This exercise set consists of

**Problem 1:** the third problem from the exam set from May, 2022.

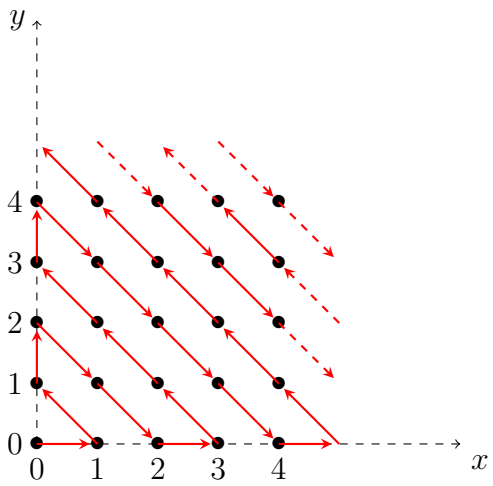
# Problem 1

1. Declare a function `flip: seq<'a*'b> -> seq<'b*'a>`. The function `flip` transforms a sequence $(a_0, b_0), (a_1, b_1), \ldots, (a_i, b_i), \ldots$ to the sequence $(b_0, a_0), (b_1, a_1), \ldots, (b_i, a_i), \ldots$.

2. Declare a function `dia` $n$, where $n$ is a non-negative integer, that generates the sequence of pairs $(0, n), (1, n-1), \ldots, (n-1, 1), (n, 0)$. For example, `dia 0` is a sequence containing just $(0, 0)$, `dia 2` is the sequence $(0, 2), (1, 1), (2, 0)$ and `dia 3` is the sequence $(0, 3), (1, 2), (2, 1), (3, 0)$.

The following figure illustrates a traversal of all integer coordinates in the first quadrant. Following the red arrows, we see that the sequence of coordinates starts with $(0, 0), (1, 0), (0, 1), (0, 2), (1, 1), (2, 0), (3, 0), (2, 1), (1, 2), (0, 3), (0, 4), \ldots$.

This infinite sequence is named `allCoordinates`.




3. Give a declaration of `allCoordinates`.
   Hint: You may use `dia` and `flip` as helper functions, even if you did not provide declarations for these functions.