

# Discussion 3: Domain and Range, Higher Order Functions

## Domain and Range

1. Determine the domain and range of the following Snap! blocks:

a.



Domain: \_\_\_\_\_, \_\_\_\_\_

Range: \_\_\_\_\_

b.



Domain of foo: \_\_\_\_\_

Range of foo: \_\_\_\_\_

Data type of var: \_\_\_\_\_

c.



Domain of foo: \_\_\_\_\_, \_\_\_\_\_

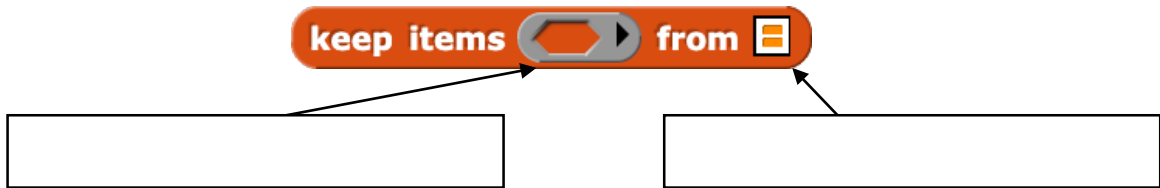
Range of foo: \_\_\_\_\_

2. Fill in the table below with the domain and range of the following higher-order functions:

Higher Order Function	Domain	Range	Notes

## Higher Order Functions

1. Fill in the blanks so the keep block returns a list of the positive numbers from MyList. You may assume MyList only contains numbers.



2. Write an expression that returns the sum of the squares of the numbers in YourList. You may assume that YourList only contains numbers.

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3. Describe in words what the following block outputs. You may assume OurList is a list of words.



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4. Write an expression that takes in a list, var, and returns whether there is a word with over 5 letters in the list. You may not use `length of` or `contains thing` in your solution.

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5. What is the output of the following block?



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## Challenge

1. For the questions below, determine if the two expressions are equivalent for all possible reporters `F` and lists `DATA`.

- a. `F F DATA`, `map F F over DATA`  yes  no
- b. `map F F over DATA`, `map F over map F over DATA`  yes  no
- c. `map F over F DATA`, `map F over map F over DATA`  yes  no
- d. `F map F over DATA`, `F F DATA`  yes  no

2. What is the output of the following block?

The block is a 'combine' block with 'item' set to '1'. It contains a 'map' block with 'keep items' and a condition '3 < [ ] and [ ] < 9'. The 'from' dropdown is set to a list icon. Below the 'map' block is a 'keep items' block with 'is a list?' and 'from' set to a list containing [5, 6, 8, 9]. At the bottom is a 'using' block set to '+'. The output is a blank line.

3. Which higher order function(s) could we use to solve the following problems? If there are multiple ways to solve the problem, indicate the most concise way to solve it (i.e. if there is a solution that uses 2 higher order functions and another that uses just 1, answer with the solution that uses just 1). You may assume you have access to any helper functions, as long as they don't use any loops in them.

a. Given a list of numbers, find the smallest number above 10.

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b. Given a list of words, we want to find the word that comes first alphabetically.

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c. Given a list of lists, return the first item from each list.

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