1 Question 1

Let \( f(x) = x^2 - 1 \) be a function of which domain is all the odd natural numbers less than 10.

Ex. Define the domain of \( f(x) \) as a constant list named \( f\text{-domain} \).

2 Question 2

Use the same function in Question 1.

Ex. Define the range of \( f(x) \) as a constant list named \( f\text{-range} \).

Hint You can use the constant defined in Question 1.

3 Question 3

An arithmetic sequence is a sequence of numbers such that the difference between the consecutive terms is constant. For instance, the sequence 5, 7, 9, 11, 13, 15, ... is an arithmetic progression with common difference of 2.

Exercise Write a function \( \text{ari-seq \ beg \ len \ d} \) that returns a \( \text{(listof Int)} \) containing the arithmetic sequence where the first value is \( \text{beg} \), the length of the sequence is \( \text{len} \), and the common difference is \( \text{d} \).

\( \text{(ari-seq 5 6 2)} \Rightarrow \text{(list 5 7 9 11 13 15)} \)

4 Question 4

A geometric sequence is a sequence of numbers where each term after the first is found by multiplying the previous one by a fixed, non-zero number called the common ratio. For example, the sequence 2, 6, 18, 54, ... is a geometric progression with common ratio 3.

Exercise Write a function \( \text{geo-seq \ beg \ len \ q} \) that returns a \( \text{(listof Num)} \) containing the geometric sequence where the first value is \( \text{beg} \), the length if the sequence is \( \text{len} \), and the common ratio is \( \text{q} \).

\( \text{(geo-seq 2 4 3)} \Rightarrow \text{(list 2 6 18 54)} \)
Question 5

Exercise

Write a function \( \text{magic-fn} \ n \ k \) that consumes an \texttt{Int} and a \texttt{Nat}, returns the result of performing the following operations, in order:

1. Construct a list of numbers from \( n - k \) to \( n + k \)
   (i.e. \texttt{list n-k n-k+1 ... n ... n+k-1 n+k} )
2. Multiply each number in this list by 29, then add 5 to each
3. Divide each number by 11 and round \textbf{up} the result
4. Calculate the sum of this list.