

Experiment ‘p4_3_e_positions_of_vowels’ Results

December 18, 2025

Experiment outcome: SUCCESS

Bad responses: 0

Responses containing assume : 0

Resolution attempts: 1

Hard fails (resolution): 0

Soft fails (resolution): 0

Verification attempts: 1

Problem Specification

Problem name: p4_3_e_positions_of_vowels

Natural language statement: Write a method that takes a string and returns the positions of all vowels in the string.

Method signature: p4_3_e_positions_of_vowels(s: string) returns (positions: seq<int>)

Ensures

- `forall p :: p in positions ==> 0 <= p < |s| && s[p] in ['a', 'e', 'i', 'o', 'u', 'A', 'E', 'I', 'O', 'U']`
- `forall i :: 0 <= i < |s| && s[i] in ['a', 'e', 'i', 'o', 'u', 'A', 'E', 'I', 'O', 'U'] ==> i in positions`

GenAI interactions

Below you will find all interactions between the ‘user’ (program) and the ‘assistant’ (OpenAI).

Program → GenAI

You are given the following task to perform in Dafny:

Write a method that takes a string and returns the positions of all vowels in the string.

The signature should be:

```
method p4_3_e_positions_of_vowels(s: string) returns (positions: seq<int>)
```

The method should respect the following contract:

```
ensures forall p :: p in positions ==> 0 <= p < |s| && s[p] in ['a','e','i','o','u','A','  
↳ E','I','O','U'], ensures forall i :: 0 <= i < |s| && s[i] in ['a','e','i','o','u'  
↳ ','A','E','I','O','U'] ==> i in positions
```

Produce and show only the Dafny body of this method, including the curly braces that
↳ surround it. Do not show the signature nor contract. You must not use ‘assume’
↳ anywhere in your code.

GenAI → Program

System fingerprint:

ID: chatmpl-Co4dvrTStGcPtvC44zdReNibCGOyQ

Model: gpt-5.1-chat-latest

Created at: 1766050283

Finish reason: stop

Usage: 420 tokens in, and 334 tokens out

```
{  
    var r: seq<int> := [];  
    var i := 0;  
    while i < |s|  
        invariant 0 <= i <= |s|  
        invariant forall p :: p in r ==> 0 <= p < i && s[p] in ['a','e','i','o','u','A','E','  
↳ I','O','U']  
        invariant forall j :: 0 <= j < i && s[j] in ['a','e','i','o','u','A','E','I','O','U']  
            ==> j in r  
    {  
        if s[i] in ['a','e','i','o','u','A','E','I','O','U'] {  
            r := r + [i];  
        }  
        i := i + 1;  
    }  
    positions := r;  
}
```

Final Program

```
method p4_3_e_positions_of_vowels(s: string) returns (positions: seq<int>)
    ensures forall p :: p in positions ==> 0 <= p < |s| && s[p] in ['a','e','i','o','u'
        ↪ ','A','E','I','O','U']
    ensures forall i :: 0 <= i < |s| && s[i] in ['a','e','i','o','u','A','E','I','O','
        ↪ U'] ==> i in positions
{
    var r: seq<int> := [];
    var i := 0;
    while i < |s|
        invariant 0 <= i <= |s|
        invariant forall p :: p in r ==> 0 <= p < i && s[p] in ['a','e','i','o','u','A','E','I
            ↪ ','O','U']
        invariant forall j :: 0 <= j < i && s[j] in ['a','e','i','o','u','A','E','I','O','U']
            ↪ ==> j in r
    {
        if s[i] in ['a','e','i','o','u','A','E','I','O','U'] {
            r := r + [i];
        }
        i := i + 1;
    }
    positions := r;
}
```

Total Token Usage

Input tokens: 420
Output tokens: 334
Reasoning tokens: 128
Sum of ‘total tokens’: 754

Experiment Timings

Overall Experiment started at 1766050285056, ended at 1766050291171, lasting 6115ms (6.12 seconds)
Iteration #1 started at 1766050285057, ended at 1766050291171, lasting 6114ms (6.11 seconds)