

Experiment 'P_3_10_temperature_altitude' 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: P_3_10_temperature_altitude

Natural language statement: Write a method that takes a temperature value and the altitude in meters. Return whether water is liquid, solid, or gaseous at the given temperature. The boiling point of water drops by about one degree centigrade for every 300 meters of altitude.

Method signature: P_3_10_temperature_altitude (t: real, a: nat) returns (s: string)

Ensures

- `if t < 0.0 then s == "solid" else if t == 0.0 then s == "solid or liquid" else if 0.0 < t < 100.0 - (a as real / 300.0) then s == "liquid" else if t == 100.0 - (a as real / 300.0) then s == "liquid or gaseous" else s == "gaseous"`

Requires

- `t >= -273.15 && a <= 10000`

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 temperature value and the altitude in meters. Return whether

- ↪ water is liquid, solid, or gaseous at the given temperature. The boiling point of
- ↪ water drops by about one degree centigrade for every 300 meters of altitude.

The signature should be:

```
method P_3_10_temperature_altitude (t: real, a: nat) returns (s: string)
```

The method should respect the following contract:

```
requires t >= -273.15 && a <= 10000, ensures if t < 0.0 then s == "solid" else if t ==  
↪ 0.0 then s == "solid or liquid" else if 0.0 < t < 100.0 - (a as real / 300.0) then  
↪ s == "liquid" else if t == 100.0 - (a as real / 300.0) then s == "liquid or  
↪ gaseous" else s == "gaseous"
```

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: chatcmpl-Co4T5Xw9lMurLBMFh9X2Jy33Gp3bi

Model: gpt-5.1-chat-latest

Created at: 1766049611

Finish reason: stop

Usage: 542 tokens in, and 329 tokens out

```
{  
  var bp := 100.0 - (a as real / 300.0);  
  if t < 0.0 {  
    s := "solid";  
  } else if t == 0.0 {  
    s := "solid or liquid";  
  } else if t < bp {  
    s := "liquid";  
  } else if t == bp {  
    s := "liquid or gaseous";  
  } else {  
    s := "gaseous";  
  }  
}
```

Final Program

```
method P_3_10_temperature_altitude (t: real, a: nat) returns (s: string)
  requires t >= -273.15 && a <= 10000
  ensures if t < 0.0 then s == "solid" else if t == 0.0 then s == "solid or liquid"
    ↪ else if 0.0 < t < 100.0 - (a as real / 300.0) then s == "liquid" else if t
    ↪ == 100.0 - (a as real / 300.0) then s == "liquid or gaseous" else s == "
    ↪ gaseous"
{
  var bp := 100.0 - (a as real / 300.0);
  if t < 0.0 {
    s := "solid";
  } else if t == 0.0 {
    s := "solid or liquid";
  } else if t < bp {
    s := "liquid";
  } else if t == bp {
    s := "liquid or gaseous";
  } else {
    s := "gaseous";
  }
}
```

Total Token Usage

Input tokens: 542

Output tokens: 329

Reasoning tokens: 192

Sum of 'total tokens': 871

Experiment Timings

Overall Experiment started at 1766049613031, ended at 1766049618118, lasting 5087ms (5.09 seconds)

Iteration #1 started at 1766049613031, ended at 1766049618118, lasting 5087ms (5.09 seconds)