

Experiment ‘2_7_circle_properties’ 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: 2_7_circle_properties

Natural language statement: Write a method that takes a radius and then returns the area and circumference of a circle with that radius and the volume and surface area of a sphere with that radius.

Method signature: circle_properties(radius: real) returns (circumference: real, area: real, surface_area: real, volume: real)

Ensures

- circumference == $2.0 * 3.14159 * \text{radius}$
- area == $3.14159 * \text{radius} * \text{radius}$
- surface_area == $4.0 * 3.14159 * \text{radius} * \text{radius}$
- volume == $(4.0 / 3.0) * 3.14159 * \text{radius} * \text{radius} * \text{radius}$

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 radius and then returns the area and circumference of a circle with that radius and the volume and surface area of a sphere with that radius.

The signature should be:

```
method circle_properties(radius: real) returns (circumference: real, area: real,  
    ↪ surface_area: real, volume: real)
```

The method should respect the following contract:

```
ensures circumference == 2.0 * 3.14159 * radius, ensures area == 3.14159 * radius *  
    ↪ radius, ensures surface_area == 4.0 * 3.14159 * radius * radius, ensures volume ==  
    ↪ (4.0 / 3.0) * 3.14159 * radius * radius * radius
```

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-Co4PYaliEOeUDWuAc90IHeSydYUWk

Model: gpt-5.1-chat-latest

Created at: 1766049392

Finish reason: stop

Usage: 440 tokens in, and 290 tokens out

```
{  
    circumference := 2.0 * 3.14159 * radius;  
    area := 3.14159 * radius * radius;  
    surface_area := 4.0 * 3.14159 * radius * radius;  
    volume := (4.0 / 3.0) * 3.14159 * radius * radius * radius;  
}
```

Final Program

```
method circle_properties(radius: real) returns (circumference: real, area: real,  
    ↪ surface_area: real, volume: real)  
    ensures circumference == 2.0 * 3.14159 * radius  
    ensures area == 3.14159 * radius * radius  
    ensures surface_area == 4.0 * 3.14159 * radius * radius
```

```
    ensures volume == (4.0 / 3.0) * 3.14159 * radius * radius * radius
{
    circumference := 2.0 * 3.14159 * radius;
    area := 3.14159 * radius * radius;
    surface_area := 4.0 * 3.14159 * radius * radius;
    volume := (4.0 / 3.0) * 3.14159 * radius * radius * radius;
}
```

Total Token Usage

Input tokens: 440

Output tokens: 290

Reasoning tokens: 192

Sum of ‘total tokens’: 730

Experiment Timings

Overall Experiment started at 1766049393392, ended at 1766049398916, lasting 5524ms (5.52 seconds)

Iteration #1 started at 1766049393392, ended at 1766049398916, lasting 5524ms (5.52 seconds)