

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 * radius`
- `area == 3.14159 * radius * radius`
- `surface_area == 4.0 * 3.14159 * radius * radius`
- `volume == (4.0 / 3.0) * 3.14159 * radius * radius * 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: chatcmpl-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)