In [ ]:
```
# Initialize Otter
import otter
grader = otter.Notebook("13_module_q_temp.ipynb")
```

❓ What is a Python Module?

In [ ]:
```
# Run this block of code by pressing Shift + Enter to display the question
from questions._13_module_q import Question1
Question1().show()
```

In [ ]:
```
# Run this block of code by pressing Shift + Enter to display the question
from questions._13_module_q import Question2
Question2().show()
```

In [ ]:
```
# Run this block of code by pressing Shift + Enter to display the question
from questions._13_module_q import Question3
Question3().show()
```

🦸 Avengers Mission: Python Modules!

The Avengers need your coding skills to prepare for their next mission. Your task is to help them with three important calculations using Python's **`math` module**.

Mission Objectives

1. **Thor's Task**: Calculate the area of Mjolnir's circular base. The radius is 10 units. Use the formula for the area of a circle:

   $$\text{Area} = \pi \times r^2$$

   Use the constant `math.pi` and store the result in a variable named `hammer_area`.
2. **Iron Man's Task**: Compute the cosine of 45 degrees to optimize his repulsor targeting system.

   - First, convert 45 degrees to radians using:

     $$\text{Radians} = \text{Degrees} \times \frac{\pi}{180}$$

     Use the function `math.radians` to handle this conversion.
   - Then, calculate the cosine using `math.cos`.
     Store the result in a variable named `iron_cosine`.
3. **Captain America's Task**: Determine the least common multiple (LCM) of 12 and 18 to synchronize the team's communication devices.

   - First, find the greatest common divisor (GCD) using `math.gcd`.
   - Then, calculate the LCM using the formula:

     $$\text{LCM}(a, b) = \frac{|a \times b|}{\text{GCD}(a,b)}$$

   Store the result in a variable named `cap_lcm`.

Requirements

- Write a Python program to perform these calculations.
- Use the **`math` module** to simplify your work.
- Assign the results to the variables `hammer_area`, `iron_cosine`, and `cap_lcm`.
- Print the results at the end of your program so the Avengers can see them.

Now, go save the world with your coding skills! 🌟

In [ ]:
```python
# Add your import statement here
# BEGIN SOLUTION
import math

# END SOLUTION


def avengers_assemble():
    # Thor's hammer base area (circle area formula: πr²)
    hammer_area = math.pi * (10**2)  # SOLUTION

    # Iron Man's cosine calculation (convert degrees to radians first)
    iron_cosine = math.cos(math.radians(45))  # SOLUTION

    # Captain America's LCM calculation
    # Find the LCM of 12 and 18
    a = 12
    b = 18
    cap_lcm = abs(a * b) // math.gcd(a, b)  # SOLUTION

    return hammer_area, iron_cosine, cap_lcm

# Do not modify the code below this line
# Print results
hammer_area, iron_cosine, cap_lcm = avengers_assemble()


print(f"Mjolnir's base area: {hammer_area}")
print(f"Iron Man's cosine of 45 degrees: {iron_cosine}")
print(f"Captain America's LCM: {cap_lcm}")
```

In [ ]:
```python
grader.check("avengers-mission-modules")
```

Submission

Make sure you have run all cells in your notebook in order before running the cell below, so that all images/graphs appear in the output. The cell below will generate a zip file for you to submit. **Please save before exporting!**

In [ ]:
```python
# Save your notebook first, then run this cell to export your submission.
grader.export(run_tests=True)
```