Manisa Celal Bayar University – Department of Computer Engineering
CSE 3237 Parallel Programming – Midterm Exam

Name and Surname	
Student Id	
Signature	

Question	1	2	3	4	Total
Score					

		Learning Objectives					
		L1	L2	L3	L4	L5	L6
Questions	Q1				✓		
	Q2		✓	✓			
	Q3	✓					
	Q4					✓	

Questions

Q1 (25 Points) What is Python GIL? Explain in detail.

Q2 (25 Points) Suppose that you want to get some help from your friends to solve some questions. You should send four questions to different four people at the same time and then wait for their answers. The signature of the coroutine that you can use is `get_answer(friend: str, question: str) -> str`.
You should run this coroutine with the data given below:

```
questions = [
      "What is the best way to learn Python?",
      "Code quality or fast development?",
      "Why did I take this class?",
      "Where did Bora find these questions?"
]
friends = ["Rossum", "Eich", "Backus", "Stroustrup"]
```

Write a coroutine with the name `main` and run it from `__main__` block.

Q3 (25 Points) Write the decorator with the name `MakeThreads` which creates desired number of threads from a function as given in the code below.

```
@MakeThreads(4)
def main():
        t = threading.current_thread().name
        print(f"Hi from {t}")
```

Q4 (25 Points) One can estimate the value of Euler's number with an equation given as

$$e = \sum_{i=0}^{n} \frac{1}{i!}$$

which can be implemented as

```
e = 0
for i in range(0, n+1):
            e += 1 / math.factorial(i).
```

You are expected to write a program which satisfies the following requirements:

- Create a class with the name `EstimateEuler` that inherits from `threading.Thread`
- `EstimateEuler` should be a daemon thread
- The class variable `e` should be **private**
- The value of `e` should be protected by a `threading.Lock`.
- For each increment of `i`, your daemon thread should sleep 1 second.
- `EstimateEuler` should have a method with the name `value` to return the current value of `e`.
- The main function should check the value of `e` every second until user interrupts the program.

You have 90 minutes, gl hf.
Assoc. Prof. Dr. Bora Canbula