Task 1

Part A

In a hospital's server, a function *check_blood_types* of two variables, *donor* and *recipient*, is implemented in a dynamically typed language:

```
function check_blood_types(donor, recipient){

  …
```

?

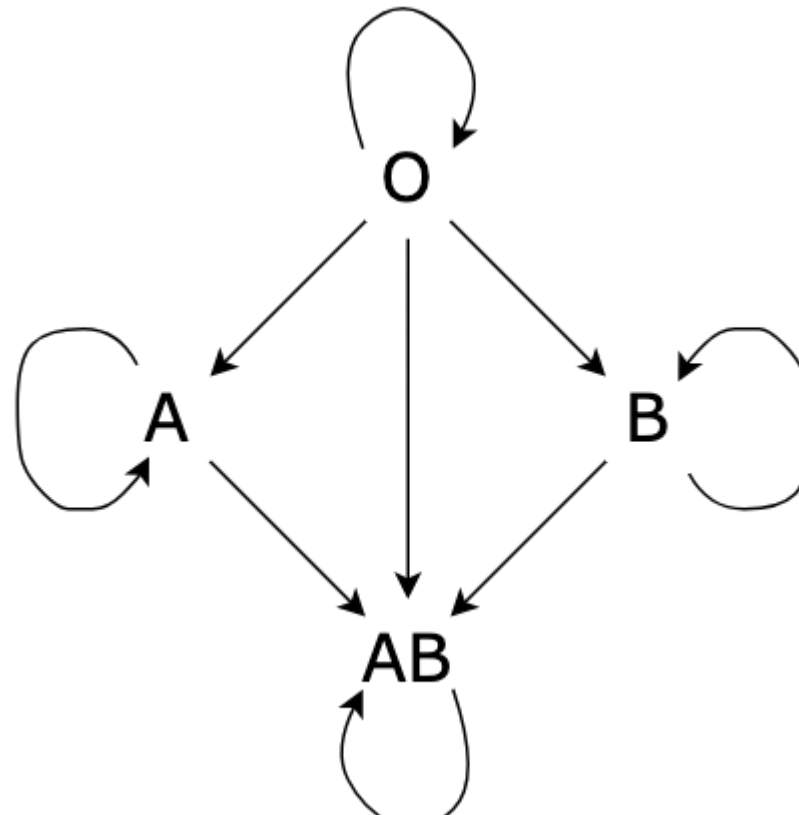⚠️ You have 5 minutes to submit this task. Late submissions will be penalized. 🏃

check_blood_types ... *...pient* is an object

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Submit solution

donor belongs, and ending at the class to which *recipient* belongs. Otherwise, *check_blood_types* returns *False.*

Four objects *john, la* [...] asses *O, A, B,* and *AB,* although we dor [...] [...]g

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- *check_blood_types(max, recipient)* returns *True* for every *recipient* among *john, lauren, katia,* and *max*

Question 1: Which of the following statements are certainly true, based on the available information? **Select all that apply.**

- ☐ *john* has type *A*
- ☑ *katia* has type *AB*
- ☐ *lauren* might have type *B*
- ☑ *john* and *lauren*'s types are among *A* and *B*
- ☑ *max* has type *O*
- ☑ The four objects must have all different types from each other

One day, three peop⬚ ⬚ree objects are
then instantiated by ⬚es:

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Three other people in need of blood register as recipients:

```
roger = A()
rachele = B()
raha = AB()
```

Question 2: Suppose that three (donor, recipient) pairs are created at random, choosing without repetitions from these three donors and three recipients. What is the probability that *check_blood_types* returns *True*—that is, a donation is allowed—in **all three** resulting pairs? **Select one.**

○ 1/5

○ 1/3

○ 1/2

◉ 2/3

○ 1

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○ It depends on how frequent each blood type is in the population

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* * *

Part B

Suppose that we maintain a small photo enhancing application, which relies on 15 identical GPUs to process the pictures uploaded by the users. All together, the GPUs can process 3000 pictures every 1.5 hours, on average. One day, 3 GPUs become unavailable.

Question 3: How many pictures can the remaining GPUs process each hour, on average? **Insert a numerical answer.**

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Only numerical answe

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Imagine that we own an e-store selling some items. Before being able to see and buy the items, users are required to sign in with their personal information. Then, they can add a number of items to a cart and buy them by making a payment in Euros. We have a database containing three tables, described below.

Customers is a table containing one row for each customer registered to the e-store, who is identified with a unique ID.

customer_id	customer_name	customer_surname	country	registration_timest
...	...	...	...	...
fs53hkmcd70ik	Johann	Hahn	DE	2023-07-03 T 10:45
wz9w8snnc2re	Gabriela	Perez	ES	2023-07-03 T 12:34
...	...	...	...	...

Transactions has one row per payment. Here, *first_transaction_id* contains the unique ID of the

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customer_id	transaction_timestamp	transaction_id	spend_in_eur	first_transa
...	...	...	...	...
wz9w8snnc2re	2023-07-10 T 13:12 UTC	dn5msx8m234z	35.84	sz972nq34z
...	...	...	...	...

Transactions table

Finally, *sales* has one row for each item purchased on the e-store.

transaction_id	item_id	price_paid_in_eur
...	...	...
dn5msx8m234z	qdedc45ycxs_2023b	8.72
...		

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Sales table

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Question 4: What can we say with confidence, assuming that the content of the tables is accurate? **Select all that apply.**

- ☐ *Transactions* has at least as many rows as *customers*

- ☑ *Sales* has at least as many rows as *transactions*

- ☐ Given a certain *transaction_id,* we only need to read a single row in a single table to tell whether it was the first transaction made by that customer

- ☐ Given a certain *transaction_id,* we only need to read a single row in a single table to tell whether it was the second transaction made by that customer

- ☑ Summing all values of *spend_in_eur* in *transactions* should give the same result as summing all values of *price_paid_in_eur* in *sales*

- ☑ To compute the average number of items sold per transaction by customers' country we need to read from all three tables

- ☑ To compute th   we don't need to read from the

> ⚠️ **You have 5 minutes to submit this task. Late submissions will be penalized.** 🏃 ✕

- ☐ We could tell how many rows are present in the *transactions* table by only querying the

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One day, some users unsubscribe from our website, and when that happens we need to erase their rows from the *customers* table. However, we are able to keep all the data in the other two tables untouched.

Question 5: What information are we still able to compute after such an erasure process? **Select all that apply.**

- ☑ The average spend of a paying customer
- ☐ The average customer spend per country
- ☐ The average time it takes to a paying customer to make the first purchase
- ☑ The share of customers who made a purchase
- ☑ The average time between the first and the second purchase, for customers making at least two payments
- ☑ The average s⸻ 2023

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```
function f(n: int){
    c = 0;
    while n >= 0 do{
        n = n - 2;
        c = c + n - 2;
    }
    return c
}
```

Question 6: What sentences correctly describe the function *f*? **Select all that apply.**

☑ Whatever integer *n* is given as an input, *f* always returns an integer, without ending in an infinite loop

☑ If the input is odd, *f(n-2)* might be smaller than *f(n)*

☑ If the input is ev

⬜ If the input is odd, then the output is also odd

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- [ ] For any positive even number n, $f(n) \geq f(n-2)$
- [ ] $f(n)$ is a non-negative integer, whatever the input integer n is
- [x] If $n > 10$ is an integer, then $f(n)$ is positive
- [x] For large enough n, f is a strictly increasing function

Question 7: What does f return when the input is 7? **Insert a numerical answer.**

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Only numerical answers are accepted

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