Congrats :)
All the best for final round.

Answer the Questions in either code format, algorithm or simply
explanation in English, Accuracy is more important than the
answer size.

Q1. (n&(n+1))
    where n is a number and & is 'bitwise and' operator.
    Task is to identify whether the given number n is power
    of 2 or not, but it is found that the formula is incorrect.
    Rewrite the statement to know given n is power of 2 or not.

Q2. [a-zA-Z0-9]*@[a-z]{5,8}.[a-z.]{3,10}
    PEC database contains emails of the college students. The above
    given is a regular expression for the email validation to extract
    the emails from database, we found inconsistency in the obtained
    data. Help us to find correct regular expression to get all emails.

Q3. DECLARE a, b AND op
    READ a, b AND op
    IF op = + THEN | One of the beginner in the coding
        PRINT a+b | developed this block statements to
    IF op = - THEN | perform Arithmetic operations.
        PRINT a-b |
    IF op = * THEN | Can you make it to the advanced level
        PRINT a*b | i.e Robust.
    IF op = / THEN
        PRINT a/b

Q4. def is_power_of(num,base):
        if num < base:
            return (num==0)
        return is_power_of(num/base,base)
    print(is_power_of(8,2))   # output: True
    print(is_power_of(70,10)) # output: False
    print(is_power_of(64,4)) # output: True

    note: The above python code is find whether num is power of base
    or not. If it is power of base it should print 'True'
    otherwise 'False'. But here always printing False. Fix the bug.

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Q5. The count_files function recursively counts the number of files
    the given base folder, by going through each of the subfolder in
    the base folder. But it has a bug! count_files function calculating
    incorrectly, Can you spot the problem and fix it ?

    def count_files(folder):
        count = 0
        for file in get_files(folder):
            count += 1
            if is_folder(file):
                count += count_files(folder)
        return count

----

① A. Consider 2 powers: $\{2, 4, 8, 16, \ldots \ldots\}$.

Truth Table for AND operation
with 2 operators.

A	B	A AND B
0	0	0
0	1	0
1	0	0
1	1	1

→ The table is
well known

Now, convert 2 powers from decimals to binary
number systems.

$(2)_{10} \Rightarrow (10)_2$, $(4)_{10} \Rightarrow (100)_2$ ≈ ......

Take 16, as our reference.

$(16)_{10} \Rightarrow (10000)_2$; consider $(n-1) \Rightarrow 15$

$(15)_{10} \Rightarrow (01111)_2$

Just apply bitwise & to 16 & 15 ⇒

```
  10000
(&)01111
_____
  00000  ⇒ [0]
```

This condition is satisfied only
for 2 powers, because its "binary".

So, Final Answer, $\boxed{(n \& (n-1)) == 0}$ ⇒ True

If True ⇒ power of 2

Otherwise, not the power of 2.

② A:

Given RE :

[a-zA-Z0-9]*@[a-z]{5,8}.[a-z]{3,10}

Here, The "domain" part is okay i.e after '@'.
Problem is with "email id", i.e before '@'.
There you can add some special characters in
the id domain such as {.!#$%+_....} and one
more thing is to replace '*' with '+' before '@'.
It is because '*' accepts zero length also.

[a-zA-Z0-9._-$#&.]+@[a-z]{5,8}.[a-z]{3,10}

③ A: ~~order~~ Robust algorithm.

DECLARE a, b AND op

READ a, b AND op

IF op = + THEN
    PRINT a+b

ELSE IF op = - THEN
    PRINT a-b

ELSE IF op = * THEN
    PRINT a*b

ELSE IF op = / THEN CHECK
    IF b = 0 THEN
        PRINT "Divide By Zero Error"
    ELSE
        PRINT a/b

In Mathematics,

$$\frac{anything}{zero} = undefined,$$

so, if b = 0,
then divide by zero.
error

④A: correct program

```
def is_power_of (num, base):
    if num < base:
        return (num == 1)          ⟶ change  0 ⟶ 1
                                            ‾‾‾‾‾‾‾
                                            1 is correct.
    return is_power_of (num/base, base)

print (is_power_of (8, 2))   # True
print (is_power_of (90, 10))  # False
```

⑤A: Given code:

```
1    def count_files (folder):
2        count = 0
3        for file in get_files (folder):
4            count += 1
5            if is_folder (file):
6                count += count_files (folder)
7        return count
```

In this code, there are 2 mistakes,

1. In line number 6,

    ┌─────────────────────────────────┐
    │ count += count_files (file)   │   folder ⟶ file
    └─────────────────────────────────┘

2. Even after rectifying error 1, the count is equals
   to no. of (folders + files) in the given base folder.
   So, to correct it, we need to use else block.

Correct code:

```
def count_files (folder):
    count = 0
    for file in get_files(folder):
        if is_folder(file)
            count += count_files(file)
        else:
            count += 1

    return count.
```

It gives only count of files not includes the count of sub folders in the given base folder.

NOTE: This is the Real World application of Recursion to count files.

You check from anywhere,
link to the pdf.

https://github.com/abhishekgedelacode/social/
blob/master/bugdebug.pdf