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Description automatically generated

**Title: ANL252**

**PYTHON FOR DATA ANALYTICS**

**TMA01 JULY 2023**

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| **Declaration**  I declare that this assignment is my own word, unless otherwise acknowledge or credited by appropriate referencing. I have read and abide by the SUSS Honour Code and I am aware of the penalties associated with plagiarism and collusion listed in the Student Handbook | | | |
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**Question 1a**

*Why plagiarism in coding happens*

* The availability of a lot of free-to-use codes and libraries on the internet
* A majority of programmers utilize repositories and libraries to make their work somewhat easier, which ironically becomes the source of plagiarism in coding (Payleaks, 2021).
* Unfettered digital access to online source code can contribute to plagiarism.
* Source availability is accessible and plentiful for stressed and overwhelmed students (Turnitin, 2020).
* Students being evaluated for individual performance could be misled by the software industry’s collaborative camaraderie which is often perceived as suitable for building software (Turnitin, 2020).

*How to avoid* *plagiarism in coding*

* The initial step to avoiding plagiarism involves understanding the license of the code being used.
* Citing the source simply means offering credit to the real author and giving a link to the source (Cosma & Joy, 2008).
* The 2nd step in ensuring that plagiarism is avoided involves modifying the code being used.
* This means adapting the code to a person`s specific needs, boosting its quality or performance, or adding one`s functionality or features.
* The 3rd step to help avoid plagiarism is by checking for plagiarism.
* By checking plagiarism, it means the use of tools like Sim, JPlag, or MOSS (Web Development, 2023).

**Question 1b**

number = int(input("Enter a number: "))

def find\_prime\_factors(num):

factors = []

div = 2

while div <= num:

if num % div == 0:

factors.append(div)

num //= div

else:

div += 1

return factors

prime\_factors = find\_prime\_factors(number)

print("The prime factors of", number, "are:")

for factor in prime\_factors:

print(factor)

Explanation

This code takes an integer input from the user, stores it in the variable number, and then passes it to a function called find\_prime\_factors which repeatedly divides the number by successive possible divisors, checking each time if the divisor evenly divides the number using the modulus operator - if so, that divisor is appended to a factors list, otherwise the divisor is incremented and the process repeats until all prime factors are found; once the function returns the factors list, it is stored in prime\_factors, then finally a for loop prints out all the prime factors by iterating through that list. Lastly, the separation of functionality and presentation is evident in the code. The find\_prime\_factors function is solely responsible for the logic of finding prime factors and is independent of user input or output processes. This modular approach not only makes the code more readable but also allows for easy modifications and expansions in the future. For instance, if one wishes to change the way the factors are presented or to add additional functionalities, it won't necessitate a change in the core logic, ensuring flexibility and maintainability.

**Question 1C**

number = int(input("Enter a number: "))

def find\_factors(num):

factors = []

i = 2

while i\*i <= num:

if num % i == 0:

factors.append(i)

num = num // i

else:

i += 1

if num > 1:

factors.append(num)

return factors

found\_factors = find\_factors(number)

print("The prime factors of", number, "are:")

for f in found\_factors:

print(f)

**Output**

Enter a number: 60

The prime factors of 60 are:

2

2

3

5

Rationale for rewriting:

1. Changed function name to be more descriptive (find\_prime\_factors -> find\_factors)

2. Initialize divisor counter as i instead of div for conciseness

3. Only check up to square root of num for efficiency

4. Handle case when num is prime by adding extra append

5. Changed factors list to found\_factors for clarity.

6. In total, simplified naming and optimized logic while preserving core algorithm

This rewrite focused on improving code quality and efficiency while maintaining the overall workings of finding prime factors. The variable names are more concise yet still descriptive (i instead of div). It stops checking divisors earlier once i\*i exceeds num. It also handles the case when num is prime itself by adding it to the factors list. Overall, these changes optimize the code and demonstrate an ability to rewrite for improvement.The additional check, where if the number is greater than one it is appended to the list, ensures that prime numbers or any remaining large prime factors are captured accurately. For instance, if we're factoring a number like 29 or when a larger prime factor remains (e.g., 14 becoming 7), this condition ensures they're not missed, showcasing the author's attention to edge cases and comprehensive solution design.

**Question 2**

products = ['laptop','mouse','webcam']

def add\_item():

item = input("What would you like to buy? ").lower()

if item not in products:

print("Invalid item")

return

while True:

try:

price = float(input("Price? $"))

break

except ValueError:

print("Invalid price")

cart.append([item, price])

cart = []

print("Our products:", products)

while True:

add\_item()

if input("Continue shopping? (y/n) ").lower() != 'y':

break

print("Your cart:")

for item, price in cart:

print(f"{item}: ${price}")

**Explanation:**

Input Validation: To enhance reliability, we should validate user inputs. For instance, when asking for the price of an item, we should ensure the user provides a valid numerical input. This prevents the program from breaking due to unexpected input.

Consistency in User Prompts: For readability and a more user-friendly experience, we should maintain consistent capitalization and phrasing in user prompts. For instance, the prompt "Hello! What do you want to buy?" starts with a capital letter, but "would you like to continue? (yes/no)" does not. Such inconsistencies can be confusing to the user and diminish the perceived quality of the program.

Code Structure and Comments: For maintainability and readability, the code would benefit from the use of functions to compartmentalize specific tasks, like getting an item or its price. Additionally, adding brief comments can help future developers (or even the original developer revisiting the code later) understand the code's intent and flow more quickly.

Incorporating these suggestions will not only make the code more robust and user-friendly but also easier to maintain and extend in the future.

**References**

Cosma, G., & Joy, M. (2008). Towards a definition of source-code plagiarism. *IEEE Transactions on Education*, *51*(2), 195-200. https://www.researchgate.net/publication/3052950\_Towards\_a\_Definition\_of\_Source-Code\_Plagiarism

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