

- If you have any scratch work, please circle your final answer.
- Any code you write should run in a Jupyter cell; every character counts!
- For all questions on this exam, assume that all necessary packages have been imported.

1. According to CU's website, each student gets an *Identikey* consisting of the first two letters of their first name, followed by the first two letters of their last names, and ending with four random digits.

Write a function called `identikey` that takes two strings called `first` and `last`, corresponding to a student's first and last names, and returns a valid Identikey string for that student.

2. For the following four problems, write down what each code block would display if executed in a Jupyter cell.

(a) `(242 % 2 == 0)` and `(31 // 3 == 9)`

(b)

```
alist = [1]
for n in range(3):
    alist.append(1 + 2 * alist[n])
alist
```

(c) `[k ** 2 for k in range(-2, 2) if k != 0]`

(d)

```
first = 'matt'
for ltr in first:
    print(2 * ltr + '!')
```

3. An integer m is called a *divisor* of another integer n if m divides n evenly. In other words, m is a divisor of n if n/m is an integer. For example, the positive divisors of 6 are 1, 2, 3, and 6.

The *proper divisors* of the positive integer n are those positive divisors of n which are **not** equal to n . For example, the proper divisors of 6 are 1, 2, and 3.

- (a) Write a function called `prop_div` which takes a positive integer `n` as input, and returns a list of the proper divisors of `n`.
- (b) A *perfect number* is any integer n which is equal to the sum of its proper divisors. Define a function `is_perfect` which takes a **any** integer `n` as input and returns `True` if `n` is a perfect number, `False` if `n` is not a perfect number, and the string `'error'` if `n` is not a positive integer.

You may use the function from (a) in (b), if you find that useful.

4. Write a function `digit_sum` which takes a positive three-digit integer as input and returns the sum of those digits. For example, `digit_sum(123)` will return 6 because $1 + 2 + 3 = 6$. Use **only** arithmetic operations, **not** string operations.