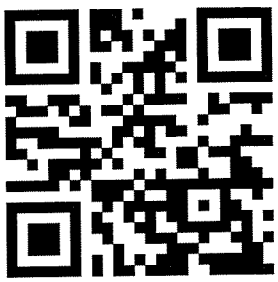



(b) **[3 marks]** Answer each of the following questions.

(i) Explain the **difference** between a *precondition* and a *representation invariant*.

Precondition : Statements that must be true while calling a function.
: Defined in the docstring of the function definition.

Representation Invariant : Statements that must be true while defining a data class.
: Defined in the docstring of the data class definition.

(ii) Write a short block of Python code that creates an **alias**. Clearly state what the alias/aliases are.

```
>>> x = 3
>>> y = x
```

Here y is an alias for x, the represent the same memory block and can be used interchangeably, unless one of them is reassined.
Aliases are variables that represent the same id or memory chunk in Python.

(iii) Suppose we call the *Extended Euclidean Algorithm* function from lecture:

```
>>> extended_euclidean_gcd(13, 10)
(1, -3, 4)
```

Explain the relationship(s) between the the two function arguments, `13` and `10`, and the three numbers in the returned tuple, `1`, `-3`, and `4`.

The first value returned 1 is the greatest common divisor of 13 and 10
The next two numbers returned represent the gcd in the form of a linear combination of 13 and 10. As such → $1 = (-3)(13) + (4)(10)$
$1 = -39 + 40 = 1$
This is because a gcd is defined as the smallest positive integer obtained on linear combination of two given numbers