Object Oriented Programming

Data Attributes

- Data attributes:
  - Private data
    - Starts with "__"
      - E.g.self. __*name = name*
  - Prevents external functions from accessing
  - Only accessed by class methods
- Data hiding
  - Achieved by declaring data members to be private
  - Can only be accessed through public methods
- Class Methods:
  - Public functions
  - Includes parameter self
  - Accesses class data attributes
- Encapsulation
  - Combining methods and attributes as a single object type
- Inheritance
  - Ability to create new classes (subclasses) which inherits ALL attributes and methods of existing class (superclass)
- Polymorphism
  - Ability of different classes to respond to same methods in different ways
  - Methods have the same name
  - Subclass method overrides superclass method
- Method overloading
  - Methods / functions of the same name
  - Different number of parameters / different types of parameters
- Reusability
  - Software components can be used in many different applications without having to modify code in the component
  - Reliability
    - Already tested and debugged
    - Developed by specialists
  - Saves time in software development
  - Decreases maintenance
- Advantages:

- Ability to hide data
- Reusability
- Methods can be changed without affecting how they are used

Class Methods:
- Initialising class:

```
class ABC:
    def __init__(self, data1, data2):
        self.data1 = data1
        self.data2 = data2

    def display(self):
        print(self.data1)
        print(self.data2)
```

- Subclass inheritance & polymorphism:

```
class DEF(ABC):
    def __init__(self, data1, data2, data3):

        # initialise superclass
        super( ).__init__( data1, data2 )

        self.data3 = data3

    # polymorphism (same name as function in superclass)
    # overrides function superclass
    def display(self):
        print(self.data3)

    # output: data3
```

Inheritance Diagram:

```
                    ┌─────────────────────┐
                    │     BankAccount     │
                    ├─────────────────────┤
                    │ accountName         │
                    │ balance             │
                    ├─────────────────────┤
                    │ deposit()           │
                    │ withdraw()          │
                    └─────────────────────┘
```

BankAccount

accountName
balance

deposit()
withdraw()

CheckingAccount

(has everything
from BankAccount)

lastCheckNum

SavingsAccount

(has everything
from BankAccount)

interestRate

InvestmentAccount

(has everything
from BankAccount)

accountRep

withdraw()

overriding