**HOMEWORK WEEK 3**

This week’s homework is a research based one. You’ll need to conduct independent learning, in combination with existing material (where available), to answer the questions below. The reason for this homework is to ensure you are aware of critical topics in CS. These topics were difficult to cover within the existing lesson schedules, but due to their importance are placed within the homework instead. Make sure to research, learn and then answer the following:

1. **What is OOP? How may you have already made use of it (e.g. class components)?**
   1. ***Feel free to give a fairly light answer here - as you’ll need to do the deep-part / actual meat in the following questions when you cover each of OOP’s pillars***

Object-oriented programming (OOP) is a [programming paradigm](https://en.wikipedia.org/wiki/Programming_paradigm) based on the concept of "[objects](https://en.wikipedia.org/wiki/Object_(computer_science))", which can contain [data](https://en.wikipedia.org/wiki/Data) and [code](https://en.wikipedia.org/wiki/Computer_program): data in the form of [fields](https://en.wikipedia.org/wiki/Field_(computer_science)) (often known as [attributes](https://en.wikipedia.org/wiki/Attribute_(computing)) or *properties*), and code, in the form of procedures (often known as [*methods*](https://en.wikipedia.org/wiki/Method_(computer_science))).

1. **What is Polymorphism?**

The 'polymorphism' word came from the Greek word 'Poly' means many and 'morphos' means forms. Thus, polymorphism represents the ability to assume several different forms

1. **What is Abstraction?**

There may be a lot of data, a class contains and the user does not need the entire data. The user requires only some part of the some part of the available data. In this case, we can hide the unnecessary data from the user and expose only that data that is of interest to the user. This is called Abstraction.

1. **What is Inheritance?**

The process of creating the new class from the existing class, the new class will acquire all the features of the existing class, this is called 'Inheritance'.

Example: parents where children acquire all the features and add their own features.

1. **What is encapsulation?**

It is a mechanism where the data (variables) and code (methods) that act on the data will bind together.

For example, take a class example, here we write variables and methods inside the class. Thus, class is binding them together. So class is an example of encapsulation.

1. **What is:**
   1. **Agile development?**

Agile software development refers to a group of software development methodologies based on iterative development, where requirements and solutions evolve through collaboration between self-organizing cross-functional teams. Agile methods or Agile processes generally promote a disciplined project management process that encourages frequent inspection and adaptation, a leadership philosophy that encourages teamwork, self-organization and accountability, a set of engineering best practices intended to allow for rapid delivery of high-quality software, and a business approach that aligns development with customer needs and company goals.

* 1. **Waterfall development?**

**Waterfall Model** is a sequential model that divides software development into pre-defined phases. Each phase must be completed before the next phase can begin with no overlap between the phases. Each phase is designed for performing specific activity during the SDLC phase. It was introduced in 1970 by Winston Royce.

* 1. **How do they differ? Which is suited for which situation?**

The [Waterfall methodology](https://artoftesting.com/waterfall-model) is a software development methodology that is based on the sequential-linear approach of software development. In the case of the Waterfall model, all the software development activities are divided into different phases namely – Requirement Gathering & Analysis, System Design, Implementation, Testing, Deployment, and Maintenance. All these phases are performed sequentially in the given order.

[Agile Methodology](https://artoftesting.com/agile-methodology-advantages-and-disadvantages) is based on an incremental-iterative approach where the requirements of the complex projects are divided into smaller iterations involving collaboration between the different stakeholders of the project. In each iteration, a deliverable is developed, tested, and demonstrated to the client.

There are different factors like customer availability, team size, the anticipation of change, etc which should be considered while selecting the right methodology for your project.

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| Agile Development | Water Fall Development |
| Changes can be made well in advance with time and within the budget. Agile works well even if the scope is not defined in advance | Waterfall performs well when the scope is well known in advance and contract terms limit changes |
| Agile intends small and mid sized dedicated teams with high coordination | Water fall involves large teams. It decreases coordination among team members |
| Agile allows customers to be available throughout the project | Water fall requires customers to be available only at mile stones |

Once complete, please return to your instructor your answers! Remember:

* Justify and be critical of everything! This distinguishes a great answer from a good answer
* Analyse - why does x even exist? Who needs it or uses it? Who is it important to, what’s the point of it at all?