**Assignment title: Introduction to programming and tools**

Part 1:

**1. What is programming?**  
Programming is the process of writing instructions (called code) that a computer can understand and follow to perform specific tasks.

**2. Why is programming important in today's world?**  
Programming is important because it powers everything from websites and mobile apps to smart devices, ATMs, and robots. It helps automate tasks, solve problems, and build digital tools.

**3. List at least 3 real-life applications of programming:**

* **Mobile apps** like WhatsApp and Instagram
* **Online banking systems**
* **Self-driving cars**

**4. What are programming languages? Mention 5 popular ones and a use case for each:**

| **Language** | **Use Case** |
| --- | --- |
| Python | Data science and AI |
| Java | Android app development |
| JavaScript | Interactive websites |
| C++ | Game development |
| C# | Developing Window applications |

Part 2:

**1. What is Python?**  
Python is a high-level, general-purpose programming language that is easy to read and write.

**2. Who developed Python and when?**  
Python was developed by **Guido van Rossum** in **late 1980s but was officially released in 1991**.

**3. What are the main features of Python?**

* Simple and easy-to-read syntax
* Large standard library
* Cross-platform (runs on Windows, Mac, Linux)
* Supports multiple programming styles (procedural, OOP)

**4. Mention 3 areas where Python is widely used:**

* **Data science** and machine learning
* **Web development** (e.g., using Django, Flask)
* **Automation and scripting**

**5. What makes Python a beginner-friendly language?**  
Python uses plain English-like syntax, which makes it easy for beginners to learn and understand. It also requires writing fewer lines of code compared to other languages.

**Part 3:**

**1. What is an IDE (Integrated Development Environment)?**  
An IDE is a software tool that provides features like code writing, debugging, running, and auto-completion all in one place.

**2. 3 popular IDEs for Python development:**

* **PyCharm**
* **VS Code (Visual Studio Code)**
* **Jupyter Notebook**

**3. One advantage and one disadvantage of each:**

| **IDE** | **Advantage** | **Disadvantage** |
| --- | --- | --- |
| PyCharm | Powerful tools for large projects | Heavy and slow on low-end systems |
| VS Code | Lightweight and supports many languages | Needs plugins for Python support |
| Jupyter Notebook | Great for data science and visuals | Not ideal for large-scale apps |

**Part 4:**

**1. What is Git?**  
Git is a version control system that tracks changes in your code over time.

**2. Why do developers use Git?**  
To manage project versions, undo mistakes, and collaborate with teams.

**3. What is GitHub?**  
GitHub is an online platform to store and share code using Git. You can share your code with other people.

**4. Difference between Git and GitHub:**

* **Git** is a tool that runs locally to track changes.
* **GitHub** is a cloud service to save and share Git repositories.

**5. How does GitHub help in collaboration?**  
GitHub allows multiple people to work on the same project, track who made what changes, and review each other’s code.

**6. What is version control and why is it important?**  
Version control is the system that keeps track of changes in code. It helps developers avoid losing code, experiment safely, and work in teams efficiently.

**Part 5:**

**1. What is Google Colab?**  
Google Colab is a free, cloud-based platform where you can write and run Python code in your browser, especially useful for data science.

**2. How is Google Colab different from other IDEs?**  
It doesn’t need installation — just open in a browser. It provides free cloud storage and computing resources like GPU and TPU.

**3. Key features of Google Colab:**

* Free access to GPUs
* Code runs in the cloud
* Easy sharing like Google Docs
* Jupyter Notebook interface
* Saves notebooks in Google Drive

**4. Common use cases in ML or data analysis:**

* Training machine learning models
* Data cleaning and visualization
* Exploratory data analysis (EDA)
* Running deep learning experiments

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