Assignment 0

1. What is the difference between a function and a program?

Response:

- A **function** is a named block of code that performs a specific task and can be called multiple times in a program.
- A **program** is a collection of one or more functions that work together to achieve a specific goal.

2. Explain the concept of **scope** in programming.

Response:

**Scope** in programming refers to the visibility and accessibility of variables, functions, and other elements within a program. It determines where a variable or function can be accessed or used.

3. What is the purpose of ** commenting** in code?

Response:

- **Commenting** is the practice of adding explanatory notes or comments to code to improve its readability and maintainability.
- It helps other developers understand the purpose and logic of the code, making it easier to maintain and modify.

4. What is the difference between **inheritance** and **polymorphism** in object-oriented programming?

Response:

- **Inheritance** allows a class to inherit properties and methods from another class, creating a hierarchy of classes.
- **Polymorphism** refers to the ability of an object to take on many forms. It allows classes to define the same behavior in different ways.

5. What is the difference between **skybox** and **environment mapping** in 3D graphics?

Response:

- **Skybox** is a technique used to render the sky and clouds in a 3D scene by using texture maps.
- **Environment mapping** is another technique that projects a real-world environment onto a 3D object to create a natural-looking background.

6. What are the differences between **Sobel Edge Detection** and **Canny Edge Detection**?

Response:

- **Sobel Edge Detection** is a simple method that uses a 2D kernel to detect edges in an image.
- **Canny Edge Detection** is a more sophisticated method that involves several steps to enhance the accuracy and quality of the detected edges.

7. How can you improve the performance of a C program?

Response:

- **Optimize code**: Remove redundant code, improve algorithm efficiency, and use efficient data structures.
- **Memory management**: Use dynamic memory allocation wisely to avoid memory leaks and optimize memory usage.
- **Profiling and benchmarking**: Use profiling tools to identify performance bottlenecks and measure the execution time of critical sections.

8. What are the advantages and disadvantages of using a **microcontroller**?

Response:

- **Advantages**:
  - **Cost-effective**: Available at lower prices compared to other computing devices.
  - **Flexible**: Suitable for a wide range of applications.
  - **Energy-efficient**: Consume less power than desktop computers.
- **Disadvantages**:
  - Limited processing power compared to high-end computers.
  - Limited memory and I/O capabilities.
  - Limited software ecosystem.

9. What is the difference between **4-bit and 8-bit color** in graphics?

Response:

- **4-bit color** uses 4 bits to represent each color component, allowing 16 colors.
- **8-bit color** uses 8 bits to represent each color component, allowing 256 colors.

10. What are the key differences between 2D and 3D graphics?

Response:

- **2D graphics** represent images in two dimensions, using depth to create depth perception.
- **3D graphics** represent images in three dimensions, using depth, width, and height to create a realistic visual experience.

11. What is the difference between **linear and non-linear control systems**?

Response:

- **Linear control systems** follow a fixed relationship between inputs and outputs.
- **Non-linear control systems** exhibit more complex behaviors, such as saturation, dead zones, and hysteresis.

12. What are the key components of a computer system?

Response:

- **Central Processing Unit (CPU)**: Performs arithmetic and logical operations.
- **Memory**: Stores data and instructions temporarily.
- **Input and Output (I/O) Devices**: Accept inputs and produce outputs.
- **Storage Devices**: Store data permanently.

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