Question #1

- Key characteristics of cloud computing:
    - Elasticity: The ability to quickly and easily scale resources up or down to meet demand.
    - On-demand self-service: The ability to provision and manage resources without human intervention.
    - Pay-as-you-go pricing: The ability to pay only for the resources that you use.
    - Broad network access: The ability to access resources from anywhere with an internet connection.
    - Resource pooling: The ability to share resources across multiple users and workloads.
- Cloud computing vs. cloud-native computing:
    - Cloud computing is a broad term that refers to the delivery of IT services over the internet.
    - Cloud-native computing is a specific approach to software development that is designed to take advantage of the unique characteristics of cloud computing.
    - Cloud-native applications are typically designed to be scalable, resilient, and easy to manage.
- Virtualization vs. containerization:
    - Virtualization is the process of creating a virtual machine (VM) on a physical machine. Each VM has its own operating system and resources, and can run independently of the other VMs on the physical machine.
    - Containerization is the process of packaging an application and all of its dependencies into a single unit called a container. Containers share the operating system of the host machine, but they are isolated from each other.
- Public cloud vs. private cloud:
    - A public cloud is a cloud computing service that is available to the general public.
    - A private cloud is a cloud computing service that is dedicated to a single organization.

Question #2

Inbound rules for EC2 security group:

- Allow HTTP and SSH traffic from the internet

Inbound rules for RDS security group:

- Allow only connections from the EC2 security group

Outbound rules for EC2 and RDS security groups:

- Allow all outbound traffic

Question #3 Steps for launching an EC2 instance:

1. Open the AWS Management Console and go to the EC2 service page.
2. Choose Launch Instance.
3. Give it a name.
4. Choose an OS type.
5. Configure the instance details, such as the number of instances, the network configuration, and the storage configuration.
6. Add security groups to the instance.
7. Review and launch the instance.

Steps for connecting to an EC2 instance from a local machine:

1. Open a terminal window.
2. Use the following command to SSH into the EC2 instance:

```
ssh -i <keyname> user@<public_ip_address>
```

Steps for connecting an EC2 instance with an RDS instance:

1. Create a security group for the EC2 instance and allow inbound connections from the RDS security group.
2. Create a security group for the RDS instance and allow inbound connections from the EC2 security group.
3. Update the RDS instance configuration to allow connections from the EC2 security group.

4. Test the connection between the EC2 instance and the RDS instance.

Steps for creating a VPC:

1. Open the AWS Management Console and go to the VPC service page.
2. Choose Create VPC.
3. Choose an IPv4 CIDR block for the VPC.
4. Create public and private subnets.
5. Create an internet gateway and attach it to the VPC.
6. Create a route table for the public subnets and add a route to the internet gateway.
7. Create a route table for the private subnets and add a route to the EC2 instances in the public subnets.
8. Launch EC2 instances in the public and private subnets.

Question #4 Design for a VPC with 2 public and 2 private subnets:

```
VPC CIDR block: 10.0.0.0/16

Public subnets:
* 10.0.1.0/24
* 10.0.2.0/24

Private subnets:
* 10.0.3.0/24
* 10.0.4.0/24

Internet gateway:
* Attached to the VPC

Route tables:
* Public subnet route table:
    * Route to the internet gateway
* Private subnet route table:
    * Route to the public subnets

EC2 instances:
* Web servers in the public subnets
* Application servers in the private subnets
* Database server in the private subnets

RDS instance:
* In a private subnet

Security groups:
* Web server security group:
    * Allow inbound HTTP and HTTPS traffic from the internet
```

* Application server security group:
    * Allow