**Homework 3: IP Addressing and Forwarding**

Exercise 1: **IP Forwarding**

A router has a Forwarding Table with the following entries. If there is no matching network entry for a packet, the packet is forwarded out the interface matching the default entry.

|  |  |
| --- | --- |
| **Network Prefix** | **Outgoing Interface** |
| 128.0.0.0/9 | 1 |
| 128.96.0.0/16 | 2 |
| 128.96.3.0/24 | 3 |
| 172.217.128.0/17 | 4 |
| 54.239.160.0/20 | 5 |
| default | 0 |

Packets are forwarded based on IP Destination Address. In the Table below, fill in the **outgoing interface** number packets are forwarded out of based on the above Forwarding Table.

|  |  |
| --- | --- |
| **Destination IP Address** | **Outgoing Interface** |
| 128.96.2.1 | 2 |
| 128.96.3.254 | 3 |
| 128.5.6.7 | 1 |
| 128.128.1.1 | 0 |
| 172.217.160.45 | 4 |
| 54.239.160.5 | 5 |
| 54.239.176.33 | 0 |
| 10.10.10.1 | 0 |

Exercise 2: **IP Addressing**

Suppose an Institution (acme.com) is allocated a /16 IP address block from their ISP: 128.96.0.0/16. Acme.com is now free to subdivide the IP address block into subnets in a manner that matches their network topology. Acme needs to support a maximum of 256 hosts per subnet.

Answer the following questions regarding the institution’s IP addressing allocation:

1. Complete the structure of Acme’s IP addressing scheme in the figure below showing subnet ID and host ID and prefix lengths.

16 bits

Network ID allocated by ISP

8 bits

8 bits

1. How many subnets can Acme support given 256 hosts per subnet \_\_\_\_\_8 BITS\_\_\_\_\_\_\_?

256

1. What is the maximum total number of hosts that can be supported in Acme’s network \_\_\_\_\_2^16\_\_\_\_\_\_\_\_\_?

Assume packets are being forwarded to the Acme network via the ISP.

1. What part of the IP address and prefix length does the **ISP** base its forwarding decisions on?

Network ID /16

1. What part of the IP address and prefix length does **Acme** **network** base its forwarding decisions on?

Network + Subnet ID/24