Communication Fundamentals

1.What is the IPv4 dotted decimal address 192.168.0.1 in binary?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | 128 | 64 | 16 | 32 | 8 | 4 | 2 | 1 |  |
| 192 | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1100 0000 |
| 168 | | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1011 0000 |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0000 0000 |
| 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0000 0001 |
|  | Answer 11000000 10101000 00000000 00000001 | | | | | | | | | |

2.Calculate how many IP address can be formed with the 32 bits of IPv4

2 to the power of 32

3.Calculate how many IP address can be formed with the 128 bits of IPv6

2 to the power of 128

4.The island of Lilliput has a very small population, and has decided that a 10 bit IP address scheme will be sufficient to accommodate the requirements of the population. How many 10 bit IP address can be formed?

2 to the power of 10

5.Convert the following dotted decimal IPv4 address to binary. By examining the binary patterns, distinguish which is Class A, Class B and Class C.

i.10.8.78.40

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| 10 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0000 1010 |
| 8 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0000 1000 |
| 78 | | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0100 1110 |
| 40 | | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0010 1000 |
|  | Answer: 00001010 00001000 0100 1110 0010 1000 Class A | | | | | | | | | |

ii.190.20.8.60

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| 190 | | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1011 1110 |
| 20 | | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0001 0100 |
| 8 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0000 1000 |
| 60 | | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0011 1100 |
|  | Answer: 10111110 00010100 00001000 00111100 Class B | | | | | | | | | |

iii.200.12.5.6

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| 190 | | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1100 1000 |
| 12 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0000 1100 |
| 5 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0000 0101 |
| 6 | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0000 0110 |
|  | Answer: 10111110 00010100 00001000 00111100 Class C | | | | | | | | | |

6.What is the IPv6 Hexadecimal address 2001:0DB8:85A3:0000:0000:8A2E:0370:7334 in binary?

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 |  |
| 2 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| D | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 |  |
| B | | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |  |
| 8 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |  |
| 8 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |  |
| 5 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |  |
| A | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |  |
| 3 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 8 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |  |
| A | | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |  |
| 2 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  |
| E | | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 3 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  |
| 7 | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |  |
| 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| 7 | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |  |
| 3 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  |
| 3 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |  |
| 4 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |  |
|  | Answer: 00000010 00000000 00000000 00000001 00000000 01000100 01000010 00001000 00001000 00000101 01000001 00000011 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00001000 01000001 00000011 01000101 00000000 00000011 00000111 00000000 00000111 00000011 00000011 00000100 | | | | | | | | | |

7.Give three examples of each of the following types of transmission systems, Simplex, Half Duplex, Full Duplex.

**Simplex**

Wireless Microphones

Tv boardcast

Baby monitor

**Half Duplex**

Walkie talkie

CB Radio

Taxi Cab Radios

**Full Duplex**

Mobile phone

Telephone conversion

Ordering Takeaway

8.For the following transmission systems show all the components, relating them to the full communication model including possible sources of noise in the system.

i.A picture in an art gallery

meaning of picture 🡪 picture on wall 🡪 background noise 🡪 image 🡪 room 🡪 viewer 🡪 eyes 🡪 brain

ii.A film showing in a cinema

film 🡪 screen 🡪 projector 🡪 people talking whilst movie playing 🡪 room 🡪 viewer 🡪 ears and eyes 🡪 brain

iii.A lecture

lecturer --> what he/she is saying 🡪 background noises 🡪 room 🡪 students 🡪 ears 🡪 brain

iv.A car drive

drive car a message🡪 brain 🡪 car 🡪 background noises 🡪 inside the car 🡪 the driver 🡪 eyes and ears

v.A hose pipe

get water 🡪 hose pipes 🡪 water tap 🡪 rocks 🡪 end of horse pipes 🡪 area 🡪 water taps 🡪 boiler

<http://staffweb.cms.gre.ac.uk/~sp02/fundamentals/95343solutions.htm>