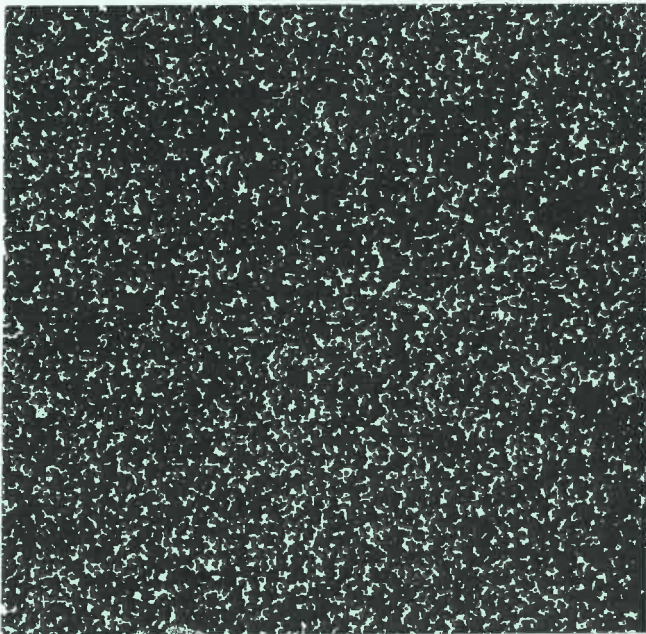
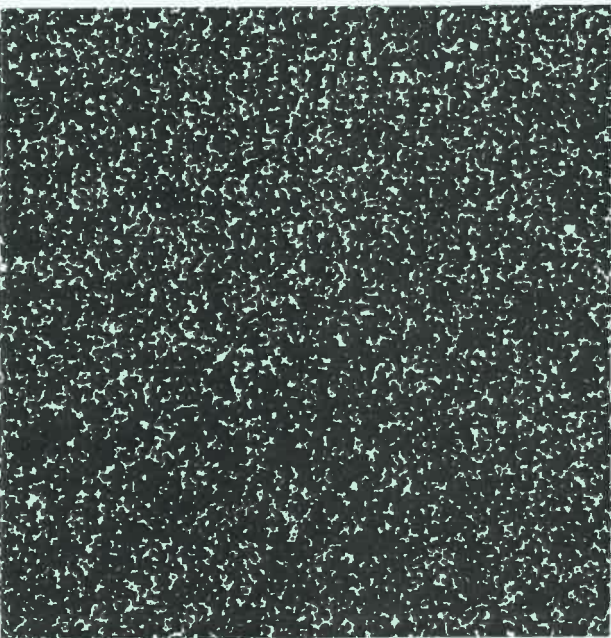






1.

a)

i)

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
1 | 1 | 1 | 1 | 0 | 0 | 1 | 1

11100111₂

ii)

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
0 | 1 | 1 | 0 | 0 | 0 | 1 | 0

01100010₂

b)

i)

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
1 | 1 | 1 | 1 | 0 | 0 | 0 | 1

128 + 64 + 32 + 16 + 1 = 241₁₀

ii)

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
0 | 0 | 1 | 0 | 1 | 0 | 1 | 1

64 + 16 + 4 + 1 = 85₁₀

c)

i)

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
0 | 1 | 1 | 1 | 1 | 1 | 1 | 2

01111111₂

ii)

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
1 | 0 | 1 | 1 | 1 | 1 | 0 | 1

10111101₂

d)

i)

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
1 | 0 | 1 | 1 | 0 | 1 | 0 | 1

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
1 | 0 | 1 | 0 | 1 | 0 | 1 | 2

128 + 32 + 4 + 1 = 165₁₀

!!) 3) 8 | 4 | 2 | 1
F) 8 | 4 | 2 | 1

2

128 | 64 | 32 | 16 | 8 | 4 | 2 | 1
1 | 1 | 1 | 1 | 1 | 1 | 1 | 1

/

$$32 + 16 + 8 + 4 + 2 + 1 = 63_{10}$$

e) 32 | 16 | 8 | 4 | 2 | 1
1048 | 2048 | 4096 | 8192 | 16384 | 32768

$$32768 + 16384 + 8192 + 4096 + 2048 + 1024 + 512 + 256 + 128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 65535 + 1 = 65536 \text{ values}$$

2

/

f) i) $1920 \times 1080 = 2073600 \times 32 = 66355200 \text{ bits}$

3

ii) $66355200 / 20 = 3317760 \text{ bits}$

2

iii) $66355200 / 20480000 = 3 \text{ seconds}$

4

g) 500 mb/s

ii) 8 GB

iii) 17 GB

2)

a)

i)

The address bus transports addressing addresses that have been generated by the CPU.

ii)

The control bus send and monitors signals to and from the various elements in the system.

iii)

The data bus carries information to and from the components in the system.

b)

The two bi-directional buses are the data bus and the control bus. The data bus carries information to RAM but it also receives information from ROM as well as RAM. The control bus sends signals to the components, as well as monitoring these signals, therefore making it bi-directional.

c)

The advantages of USB is that it is backwards and forwards compatible. For example, a device using USB 3.0 could work using a USB 1.0 port. Also a device using USB 1, could work on a USB 3.0 port. Another advantage is that it is future proof, manufacturers can develop future devices that will be supported by USB 3.0. A limitation of USB is that the data transfer speed is slower compared to SATA. Another limitation is that devices that are using a different version to the port will run slower when connected.

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3)

a)

The first issue I can identify is that the system board can only support up to 8GB of RAM. To resolve this I recommend upgrading the system board to one that supports 32GB of RAM. Reading the system board manual can help when deciding to upgrade components as it will state the compatibility. Another issue I have identified is that there is a 32-bit operating system installed when the system uses a 64-bit processor. I recommend that they re-install a 64-bit version of Windows to make the system run more smoothly. Another recommendation I would make is to upgrade the processor from an i3 to something more powerful like an i5 or an i7. Having the extra processing power will be useful, especially as the user is using the system for image editing.

b)

i)

The purpose of Virtual Memory is to allocate a space on the storage device as additional memory. This is so programs and tasks that may need to run quickly can do so without using RAM space.

ii)

A page fault is when an error occurs when loading a task or application from virtual memory.

9

2

c) The task manager allows the user to monitor the performance of the components of the system. It also allows them to see what programs and processes are running and gives them the option to stop them running. It allows the user to troubleshoot problems that could cause the system to run slower than expected.

4

4) To ensure the connection is as secure as possible, using a firewall to prevent unwanted traffic on the network will provide more security. Ensuring that all passwords used are strong and difficult to crack can prevent a brute force attack. Limiting the number of devices on the network will reduce the number of vulnerable weak spots that an attacker can take advantage of. Providing basic advice on the dangers of phishing and what to look for can ensure that users don't put the network at risk.

6.

b) The typical TCP/IP v4 address is an address made up of 8-bit numbers, meaning there are 256 potential values for each part of the address. The typical address looks like this "192.168.10.1". The limitations of this are that there are billions of IP addresses around the world. Eventually, we will run out of IP addresses on IPv4.

3

c) DHCP, or Dynamic Host Configuration Protocol is used to automatically assign devices an IP address on the network. The IP address is leased temporarily to the device to ensure that there is always enough IP addresses for new devices. Once a lease expires, it can be automatically renewed when connected to the network. The importance of DHCP is that the network manager would have to manually assign each new device a static IP address, which could take a lot of time on a large network and could lead to problems in future when there is no more left.

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