IT admission test | version 1.
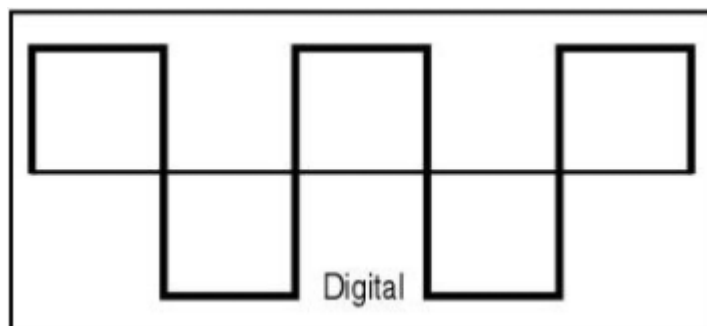
(*text for the question 1*)

An analogue signal can be characterized as a time dependency of different voltage sizes (continuous function).
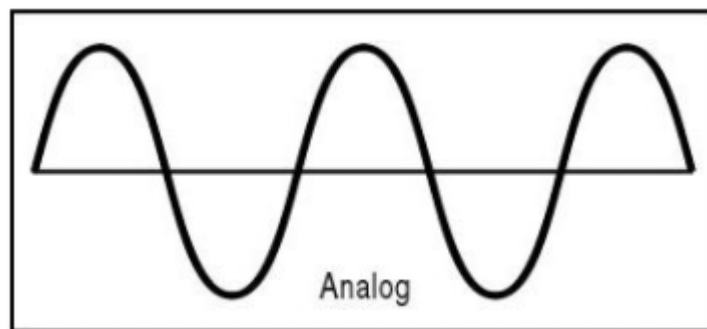
A digital signal can be characterized as a signal of dependence of only two voltage values. It is expressed in binary characters (1/0).

Signal sampling is the process of determining the value of a continuous signal at a specific point in time. Although the continuous signal section can be infinitely enlarged to observe its infinitesimal details, computers have a finite memory capacity and finite power, so it is necessary to sample the continuous signal.
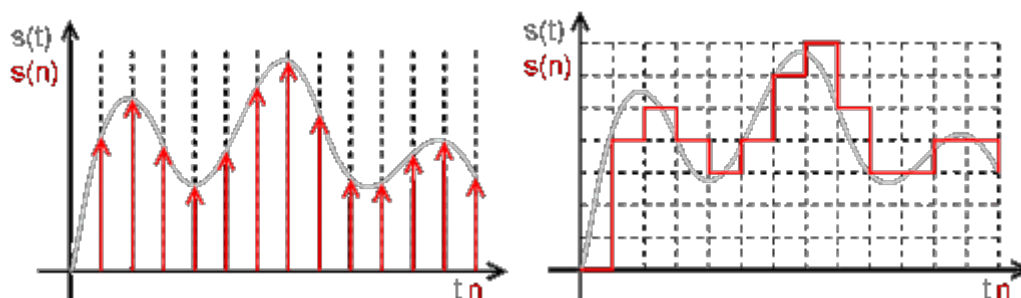
1) **Which of these communication methods resembles a digital signal?**
   A) Morse Code
   B) Spoken word
   C) Sign language
   D) Braille

(*assignment for question 2*)
On the bank of the river stands a man with a wolf, a goat and a head of cabbage. His task is to transport everything across the river, but only one thing can always fit in the boat. One must also not leave a goat and cabbage alone, because an unguarded goat would eat cabbage, nor must one leave a wolf and a goat alone, because an unguarded wolf would eat a goat.

2) **How many times during the voyage will one never be alone on the ship?**
   A) 2
   B) 0
   C) 27
   D) 18

(*text on question 3*)

The output device somehow displays data and information processed by a computer or other device. This is the main way a computer tells us the results of its work. The display can be realized in the form of static and dynamic image, sound or by printing on paper. (Source:: https://it-slovnik.cz/pojem/vystupni-zarizeni/?utm_source=cp&utm_medium=link&utm_campaign=cp, 18.1.2021)

3) **Select what is the output device:**
   A) Monitor
   B) Cable
   C) Computer mice
   D) Internet

(*text for the question 4*)
FPS (frames per second) is a unit that determines the number of frames per second that a graphics card generates.

The refresh rate is the monitor's ability to render a certain number of frames in one second and is given in Hz (Hertz). In general, the higher the refresh rate the monitor has, the smoother the image it provides.

4) **If our graphics card generates 250 FPS and our monitor will have a refresh rate of 60Hz. How many frames per second will the monitor display?**

   A) 250 frames

B) 60 frames
C) 4,16 frames
D) 1 frames

(*text for the question 5*)
A web browser guides you through the Internet. It downloads information from different parts of the web and displays it on your computer or mobile device. Text, images and videos are transferred over the Internet using a protocol called Hypertext Transfer Protocol. Everything must be available in a format accessible to everyone, no matter what web browser they use. (Source: https://www.mozilla.org/cs/firefox/browsers/what-is-a-browser/, 18.1.2021)

5) **A web browser is:**
A) Operating system
B) Computer program
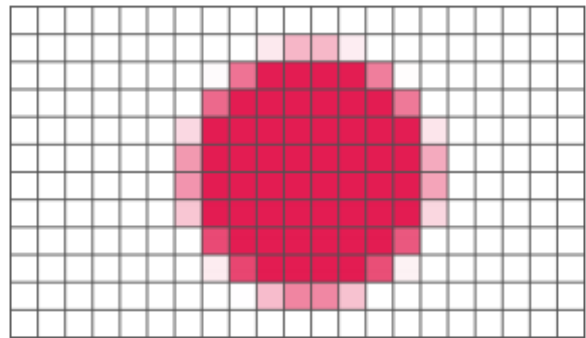C) Internet
D) Hardware

(*text for the question 6*)
Raster graphics are composed of pixels. Each of these points has its own position (coordinate). We store the graphics using the description of individual pixel points.

Vector graphics work with image information as a mathematically defined curve (vector). The information is stored using mathematical notation with several other attributes (thickness, shape, colour, etc.).
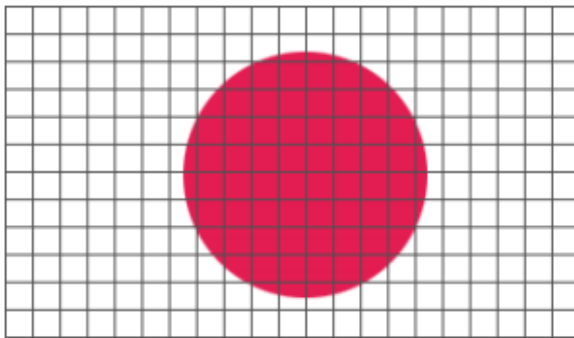
Vector graphic (picture 1)   Raster graphic (picture 2)

The human eye uses 137 million cells for image processing, where individual cells are exposed to light focused by a lens. These cells create tiny electronic impulses that go to the brain, where the image is further processed and creates the final image perception.

6) **How does the human eye perceive the image?**
A) As a raster
B) As a vector
C) As combination of both
D) As a logarithmic function

7) **What is the CTRL + F key combination (keyboard shortcut) for with the factory default settings of the Windows operating system?**
   A) Opens the search box
   B) Switches the application to "dark mode"
   C) Rotates the screen 90 degrees
   D) Image change

(*text for the question 8*)

RAID 0 (striping) - Data is stored interleaved on disks in certain blocks. Thus, for example, when a block is set to 4096 bytes (4 kilobytes), a 16 kilobyte file is divided so that the first disk contains the first and third 4096 bytes in order and the second disk in the order of the second and fourth 4096 bytes.

RAID 1 (mirroring) - The disks store exactly the same data, so the second disk is a true copy of the first disk. If one of the disks fails, the user does not lose data.
(Source: https://www.svethardware.cz/poridte-si-raid-1-zrcadleni/11180, 18.1.2021)

RAID 5 - It is more commonly used in data centres. It takes three discs to build. The first two disks are linked and the data is stripped between them and the third disk contains a self-correcting code.
(Source: https://www.datahelp.cz/clanky/co-to-vlastne-je-raid-a-jake-je-jeho-uziti, changed, 18.1.2021)

8) **RAID 5 combines the benefits of backup with which RAID?**
   A) RAID 1
   B) RAID 0
   C) RAID 3
   D) RAID 56

(*text for the question 9*)

Among other things, we create links between tables in databases. We have a total of 3 types of these ties.

Bond m:n - The m-items in the first table correspond to the n-items in the second table. For example, a Student table and a Subject table where the student can study multiple subjects while the subject may have multiple students.

Bond 1:1 - This is a join where one item in the first table corresponds to one item in the second table. An example is the Citizen table and the Birth Numbers table, where one record in the Citizen Number table corresponds to one record in the Citizen table.

Bond 1:n - ?

9) **Which example best describes the 1: n bond?**
   A) One record in Citizen table corresponds to one record in Birth number table
   B) One record in House table corresponds to one record in Citizen table
   C) We have a Customer table and an Invoice table, where an invoice can have only one customer, but a customer can have multiple invoices
   D) We have a Student table and a Course table, where a student can study more subjects and at the same time a subject can have more students

Black dot = some of the numbers are correct in the right place.
White dot = some of the numbers are correct but in the wrong place.
(Source: https://www.kryptograf.cz/category/logicke-hadanky/, 20.1.2021)
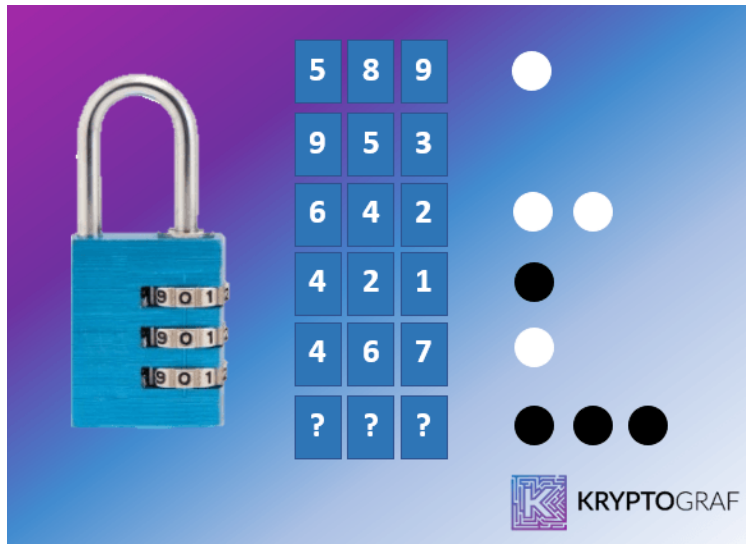
10) Choose which number will be in the last position:
   A) 826
   B) 268
   C) 517
   D) 467

Bluetooth

Bluetooth is a designation for wireless technology that is used to transmit data between fixed and mobile devices over short distances, thanks to radio UHF waves (Ultra High Frequency - short waves, designed for television, mobile phones, GPS, walkie-talkies and the like. These waves operate at frequencies of 0.3 - 3 GHz). The protocol operates in the ISM unlicensed band at frequencies of 2.402-2.480 GHz. To avoid interference with other protocols that use the 2.45 GHz frequency, the Bluetooth protocol divides the band into 78 channels (each is 1 MHz wide), changing channels up to 1600 times per second.

Bluetooth 5 has been designed to be used, among other things, in the ever-expanding Internet of Things (IoT). The Bluetooth 5 protocol offers a much higher transfer rate than its predecessors - it can theoretically reach speeds of up to 2 Mbps over a shorter distance. This value is high enough for the transmission of quality sound - the data rate for the Audio CD format is always 1411 Kbps, the data rate for the MP3 format can range from 96 Kbps to 320 Kbps, for streaming services such as Spotify it is in the range from 96 Kbps to 160 Kbps.

However, its range has also increased, reaching an incredible 200 meters in open spaces and up to 40 meters in enclosed spaces, which considerably increases not only the possibilities of listening to music, but also control and mutual communication between electronic devices or between individual elements of a smart home. The lower the baud rate, the longer the distance that the devices are able to communicate with each other. In addition, Bluetooth 5 offers greater energy efficiency, so you definitely don't have to worry about having fast battery discharge when you are using higher transfer speeds. Bluetooth 5 is backward compatible.

11) Is Bluetooth 5.0 a limiting factor for audio transmission when playing from Spotify?
- A) No, Bluetooth 5.0 offers more data flow than Spotify
- B) Yes, cable transmission is more appropriate
- C) Yes, Bluetooth 5.0 does not allow music playback
- D) No, but a fiber optic internet connection is required

12) The highest transfer rate (of these) is reached by Bluetooth 5.0:
- A) When 2 or more devices are connected
- B) At a distance of 200m in an enclosed space
- C) At a distance of 5 meters in open space
- D) When transferring MP3s

13) Which of the following multimedia media offers the largest data flow?
- A) Spotify
- B) Audio CD
- C) MP3
- D) IoT

14) Choose the correct statement
- A) The Bluetooth protocol operates in the ISM unlicensed band at frequencies of 3.402-3.480 GHz.
- B) The Bluetooth protocol operates in the 78 MHz wide frequency band.
- C) Bluetooth 5 has a data throughput of up to 1600 Kbps.
- D) The frequency band 320 - 1411 MHz is intended exclusively for Bluetooth audio transmission.

15) What will change with the new generation of Bluetooth?
- A) Allows music streaming
- B) Increasing transmission speed and reducing energy consumption
- C) Devices with the previous generation will not be backward compatible
- D) It can transfer data at a speed of 2 MB / s over a distance of 200m