J1A2 Chortle Ch2 Analog and Binary Signal

1. **What does binary mean?**

Binary means "two states." The two states are sometimes called "1" and "0", or called "true" and "false", or called "on" and "off", (or other names.) The essential characteristic is that a single binary device can be in just one of two possible states

2. **What is a bit?**

A **bit** is a single on/off value.

3. **Why do computers use binary? (4 reasons)**

1. Binary devices are Simple and easy to build.

2. Binary signals are Unambiguous (which gives them noise immunity).

3. Flawless copies can be made of binary data.

4. Anything that can be represented with some sort of pattern can be represented with patterns of bits.

4. **What is meant by the term 'unambiguous' signal? Explain using the light from a flashlight as an example.**

Unambiguous Signals: Consider Paul Revere, waiting for news of the attack of the British troops. He is expecting to see a signal lantern in the tower of Old North Church telling him how the British are attacking:

1.32456 if by land, 1.71922 if by sea.

The signal shines out! ...but Paul Revere's famous ride is delayed for several hours as he tries to figure out exactly how bright that signal is.

Lack of ambiguity is a tremendous advantage. The signal that Paul Revere was actually waiting for that night in 1775 was:

One (lantern) if by land, and two (lanterns) if by sea.

...an easily interpreted signal. All Paul Revere had to do was count. Such signals are called discrete because they have a fixed number of definite states. Sometimes the word digital is used to mean the same thing.

5. Describe what an analog signal is. Give an example.

An analog signal may continuously change in value. Its values can be anything within a range of values, and its exact value at any time is important. The graph represents an audio signal. The exact value at each time is part of the information it contains. For example, the value at time "T2" must be measured exactly.

Example: Now say that you are observing the voltage of a wire. It has been agreed that any voltage below a **threshold** will be counted as an "off" signal, and that any value above the threshold will be counted as an "on" signal.

6. Describe what a digital signal is. Give an example.

A digital signal - a must for computer processing - is described as using binary (0s and 1s), and therefore, cannot take on any fractional values. As illustrated in the graphic below, digital signals retain a uniform structure, providing a constant and consistent signal. Because of the inherent reliability of the digital signal, technology using it is rapidly replacing a large percentage of analog applications and devices. For example, the wristwatch, showing the time of day, with its minute, hour, and sweeping second hands, is being replaced by the digital watch, which offers the time of day and other information using a numerical display. A typical digital signal is represented below. Note the equally dispersed 1s and 0s.

digital

1 0 1 0 1 0 1 0