

Problem 1: How much space (in bits) do we need to store a 2h movie?

We need to store video + sound.

We start with sound:

Sampling: 44,100 Hz

16 bits for each point (2 bytes/point)

For movies, sound is stored in stereo.

$$\text{Total space} = 2 \text{ [hours]} \times 3600 \text{ [s]} \times 44100 \text{ [points]} \times 2 \text{ [bytes]} \times 2$$

~~[hour]~~
~~[s]~~
~~[point]~~
~~[point]~~

$$2 \times 3600 \times 44100 \times 2 \times 2 \text{ [bytes]}$$

Video

A video is stored with 24 images/s

One image is stored on 1 ~~11~~ ~~byte~~ Pixels.

Each pixel: R, G, B, intensity.

$$2 * 2 * 2 + 2$$

eight bytes to store in pixel.

$$V = \frac{2 \text{ [hours]} \times 3600 \text{ [s]}}{\text{[hour]}} \times \frac{24 \text{ [images]}}{\text{[s]}} \times \frac{1 \text{ [11 Pixels]}}{\text{[image]}} \times \frac{8 \text{ bytes}}{\text{[Pixel]}}$$

$$V = 2 \times 3600 \times 24 \times 1 \times 8 \text{ [11 bytes]}$$

## Exercise 2

(3)

### Knight and Knave.

On the island of knights and knaves (where knights always tell the truth and knaves always lie) you meet 3 persons,

Sue, Bob, and Mel.

Sue: "Only a knave would say that Bob is a knave"

Bob: "It is false that Mel is a knave"

Mel: "Bob would say that I am a knave?"

Simplifying:

Sue: "Bob is a knight"

Bob: "Mel is a knight"

Mel: "Bob would say that I am a knave"

Sue	Bob	Mel	Sue says	Bob says	Mel says (4)
K	K	<del>K</del>	T	T	<del>F</del>
K	<del>K</del>	K	T	<del>F</del>	T
<del>K</del>	K	K	<del>F</del>	T	T
<del>K</del>	K	K	<del>F</del>	F	F
<del>K</del>	K	K	<del>T</del>	T	F
<del>K</del>	K	K	<del>T</del>	F	T
K	<del>K</del>	K	F	<del>T</del>	T
K	K	K	F	F	F X

K: knight

k: knave

Conclusion: Sue, Bob, and Mel are knaves.