

CSE 101 Homework 04

Unless otherwise specified, all homework is expected to be completed before your next class session meets. In many cases, your next class will build on the prior day's homework and not having it completed may inhibit your understanding of new class material.

Exercise – Prepare for Encryption Class Exercises

Copy the VeraCrypt - Windows folder from the Day04\Homework-Readings folder to your USB flash drive (do not put it inside your CSE 101 folder). We will be using this software starting on Day 05 to create encrypted data on your USB flash drive.

If you have a Mac, we have also included a folder for VeraCrypt – Mac in case you wish to attempt to use this on a Mac computer. Unfortunately, we are not able to provide assistance in loading this to Macs.

Data Representation Exercises

1. Your friend tried to convert the following binary data stream to its ASCII character equivalent:
100110110100111010101011111010101011001111

The characters are in 7-bit increments and he used the ASCII conversion table we showed on class slides, but his answer was terribly wrong. He got:

Y:ZgZy

What did he do wrong, and what is the correct conversion?

2. As you have seen in class, everything about our physical world (numbers, letters, colors, sound, etc.) must somehow be converted into 0s and 1s inside of a computer. This includes when computers, such as cell phones, communicate with one another. Convert the following ASCII message to its binary equivalent (7-bit per character) in order to send a text message to fellow MSU rivals:

MSUisNumber1

3. Answer the following RGB (color) related questions:
 - a. What is an RGB value?
 - b. What color does an RGB value of (128, 13, 255) represent in Excel?
 - c. How many different colors could be represented with an RGB scheme if only 3 bits were used to represent each RGB component (3 for R, 3 for G, 3 for B)?
What is the color depth of an image using this RGB configuration?
 - d. How many different colors could be represented with an RGB scheme if 8 bits were used to represent each RGB component (8 for R, 8 for G, 8 for B)?
What is the color depth of an image using this RGB configuration?

4. The R&D group is testing an alternative color scheme to RGB labeled RGBO where an additional color component (Orange) is added to the traditional Red, Green, and Blue components in order to specify a unique color.
- How many different colors could be represented with an RGBO scheme if 7 bits were used to represent each RGBO component (7 for R, 7 for G, 7 for B, and 7 for O)?
 - How many different colors could be represented with an RGBO scheme if 8 bits were used to represent each RGBO component (8 for R, 8 for G, 8 for B, and 8 for O)?
 - Finally, how many different colors could be represented with an RGBO scheme with 4 bits for Red, 8 bits for Green, 9 bits for Blue, and 10 bits for Orange?

5. Create an image of your own in Excel, similar to smiley:
- Your grid should be 15 x 15. (What is the image resolution for this?)
 - You need to use 6 colors. (What is the color depth for this?)
 - Calculate the storage size required for your image, assuming the usage of a full **bitmap**, with 32-bit representation of colors. Give the answer in bits and in bytes.

6. In the Day04 homework folder, we have included an Excel file named **Day04HW_Icon.xlsx** that contains a bitmap image of the latest popular cartoon characters. Given an RGB color scheme where an individual color in the full bitmap uses 5 bits for the Red component, 4 bits for the Green component, and 6 bits for the Blue component:
- What is the resolution of this image?
 - What is the color depth of this image?
 - Calculate the storage size required for the full bitmap of this image. Give the answer in bits and bytes.

7. We have discussed a variety of different ways that a series of 0s and 1s can be interpreted by a computer. Given the following 7-bit binary data stream, what are all the possible data values that this data could represent?

1001100

(Two possibilities include -12 and 76)

8. To help you practice a bit more on binary numbers, we have added a D2L assessment titled binary practice. This assessment can be found in D2L under non-gradebook items on your course homepage, or under Assessment ... Quizzes.

THIS ASSIGNMENT IS NOT A GRADED ASSIGNMENT (DOES NOT HAVE A CORRESPONDING GRADEBOOK ENTRY).