INSC 562, Week 3
Asynchronous Lab
Bit Rot & Fixity

In this lab you will learn:

(1) how to view & alter the raw contents of a file (i.e., the bits),
(2) how to generate checksums for those files, and
(3) how to use checksums to determine whether a file has changed (e.g., bit rot, etc.)

Online Hex Editor: https://hexed.it/
Hex Editor for Mac: https://hexfiend.com/

Online Checksum Generator: https://codebeautify.org/checksum-calculator

What to Submit: Every student should upload 4 files to Canvas (even if you work in a group, every member must upload a copy in order to receive credit for the lab):

(1) JPEG file after you have altered the file in a hex editor
(2) TIFF file after you have altered the file in a hex editor
(3) TXT file after you have altered the file in a hex editor
(4) Document (Word, Google Doc, etc.) with answers to the questions below and the names of all group member(s)

BONUS: Upload fun/interesting examples of altered and/or destroyed files to the "File Destruction" Discussion Thread in Canvas and we'll start class next week with a brief showing of your files!

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1. Hex Editor
    a. Open the JPEG file provided in a Hex Editor. Make changes to the bits. Export the file, open it again using the image viewer of your choice. Repeat as many times as you'd like to see what kinds of alterations you can make to the image and its renderability.
    b. Repeat with the TIFF and TXT files provided.
    c. Save the altered files to submit to Canvas.
2. Checksums
    a. What was the MD5 checksum for the JPEG file before you altered it?
    b. What was the MD5 checksum for the JPEG file after you altered it?
    c. What was the MD5 checksum for the TIFF file before you altered it?
    d. What was the MD5 checksum for the TIFF file after you altered it?
    e. What was the MD5 checksum for the TXT file before you altered it?
    f. What was the MD5 checksum for the TXT file after you altered it?
3. Describe briefly how the JPEG, TIFF, and TXT files each behaved when you altered them using the hex editor.
    a. Which of these file types provided are compressed?
    b. Do compressed vs. uncompressed files behave differently? If yes, how?
    c. What implications does this have for digital preservation?
4. *BONUS: try doing the same with other file types such as audio, moving image, etc.*