



# STEGANOGRAPHY

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Additional materials may be found at [www.ncyte.net](http://www.ncyte.net)

# STEGANOGRAPHY

## MULTIDAY PROGRAMMING EXERCISE

Students will write a series of four short programs which advance a starting photograph file and a starting secret message file into a Steganographic photograph which embeds the secret message in the photograph and then decodes the secret message.

### PURPOSE

The three purposes of this exercise are 1) for students to develop a deeper and more connected understanding of modern cryptographic key exchange methods, 2) for students to become more practiced programmers, and 3) to create a solid computational framework upon which students can advance their work on the three following CCLs: Caesar Ciphers, Vigenère Ciphers, and, finally Symmetric and Public Key Cryptography.



*It's Under the Garbage Can*

Figure 1: © Warner Bros. All Rights Reserved.

### ASSIGNMENT

Model all aspects of encrypting and decrypting a secret message in a photograph. Students will start this assignment two with two photographs: a) a 400x600 pixel PNG format color photograph of their own choosing (OriginalImage) and b) a 400x600 pixel PNG format black-and-white photograph of their own choosing



(SecretMessage). The presentation included with this CCL steps students through how to create these images using a Macintosh computer and free software.

Programs 2,3, and 4, load at least one image and then create a processed image. Students should transfer this processed image to the directory for the next program. In this way, the original image in Program 2 is processed to create a new photograph file (EvenPixelPhotograph). This new processed photograph becomes the input file, for example, for Program 3.

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### PROGRAM 1

Display OriginalImage and SecretMessage to the screen.

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### PROGRAM 2

Make the sum of the RGB values of every pixel in OriginalImage an even number and output the result as a PNG format, color photograph called EvenPixelPhotograph.

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### PROGRAM 3

Open both EvenPixelPhotograph and SecretMessage at the same time. For every black pixel (0,0,0) in the SecretMessage, turn the sum of the RGB values of the corresponding pixel in EvenPixelPhotograph to an odd number. Output this result as a PNG format, color photograph called SteganographyPhotograph. This photograph is Steganography in that a secret message has now been fully embedded into the original photograph.

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### PROGRAM 4

Decrypt the secret message embedded in SteganographyPhotograph by turning every pixel in SteganographyPhotograph whose RGB value is greater than zero) to white (255,255,255). When finished, the black secret message should be clearly visible, and every other pixel should be white.

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FULL CODE AND STARTER CODE IN PROCESSING IS AVAILABLE WITH THIS CCL.

Please refer to the Programming Folder.

