

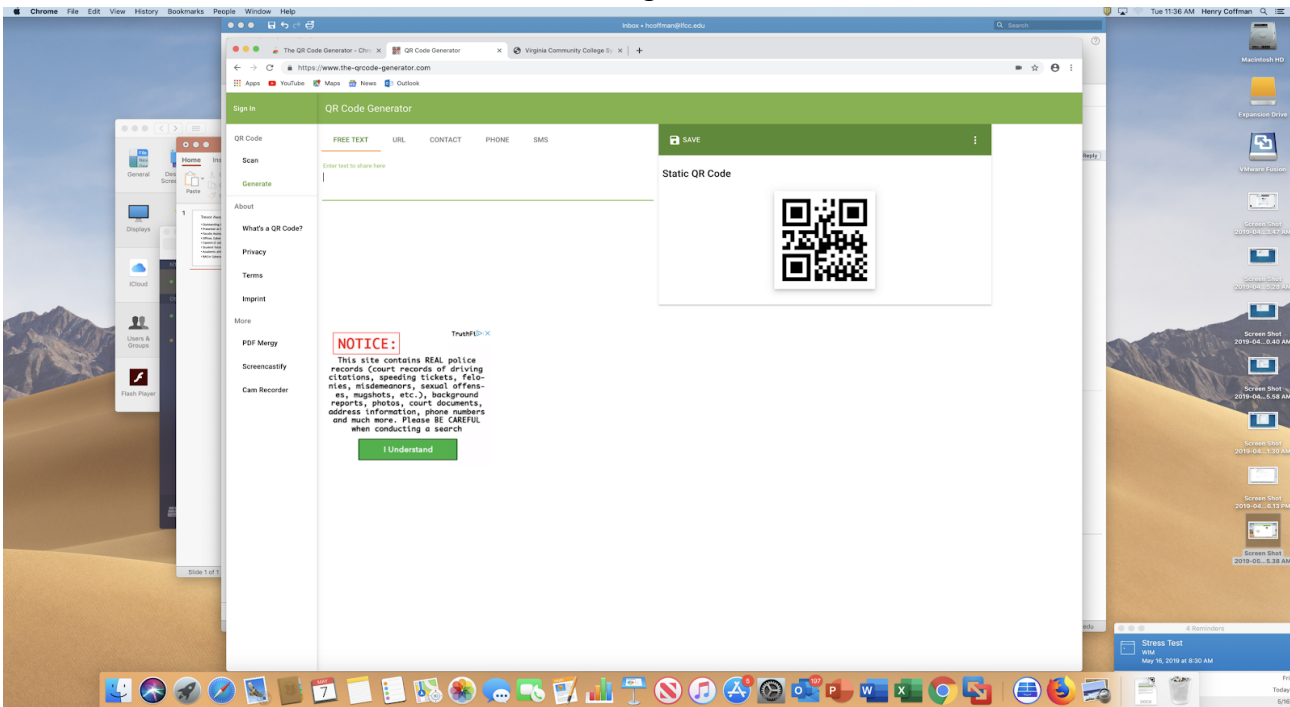
Steganography Exercises for Cyber Girls Camp

Exercise 1: Hiding Text with a physical device (a pen)

1. You have a special pen and a piece of paper in your possession.
2. Write your name on your paper with the special pen. Do you see the name?
3. On the opposite end of the pen, switch on the light and shine it on the area of which you wrote. What do you see?
4. Turn the paper over and write a secret message to a partner in the session. Make sure that it is something that you want your partner to see.
5. Switch papers between partners and each person uses the light to see what the other said. Tell your partner what was written.

Exercise 2: Using the QR Code to hide data and web links

1. First we shall create a QR Code with hidden data; namely a URL just as you see at conferences and meetings which links to web pages.
2. Open Chrome and go to <https://www.the-qrcode-generator.com/>
 - a. Or search for Google QR code and click on second link in list.
 - b. You should see the following screen or facsimile:



3. Make sure the left menu is on **Generate**. You should see a **Static QR Code** on the right and a space to enter text to the right of the menu on the left.
4. For this exercise, enter the following data for the text to be shared:

Cyber Girls are Fun

5. Save the generated code as a **png** format to the **download** folder.
 - a. Name it as "Initials" QRCodeText. (one word)
 - b. You will see it drop to the bottom left in the task bar of the browser.
 - c. Click on the file in the taskbar of which the file will pop up,
6. Print out the "Initials" QRCode Text file that you generated.
7. Now go to Scan on the left menu. If you get a message to use the computer camera, say "yes."
8. Once the camera comes on, you will see your face. Hold your QR Code printout to the camera screen.
9. You should see some text in the QRCode scan texted area..
 - a. What do you see?
10. We will repeat the exercise but let's use the url category/tab this time.
 - a. Enter the following for the url

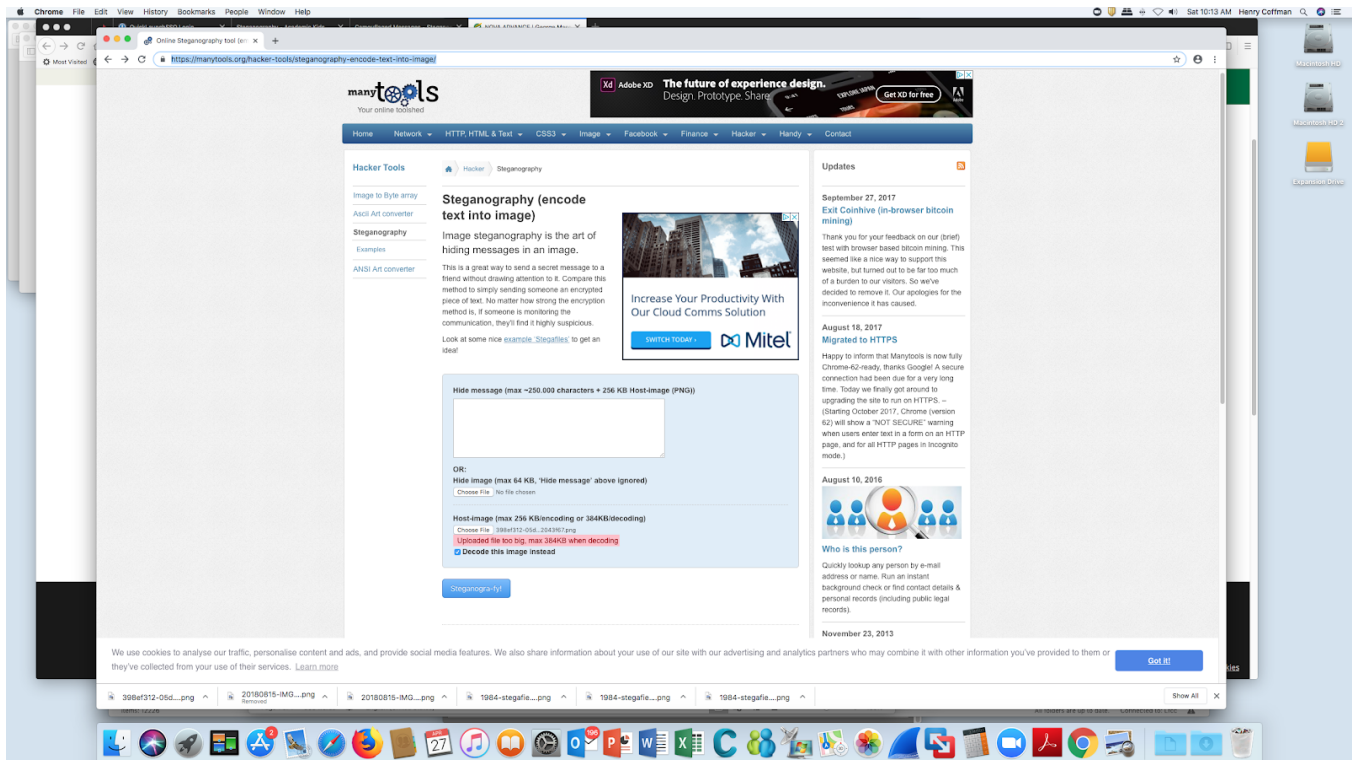
<https://www.lfcc.edu/cybersecurity>
 - b. You will see that the url can be also shorted by hitting on the "**shorten**" button. The link is transposed into a transposition substitution cipher so as not to see the original link. (This process is not that secured but good illustration.)
 - c. Repeat the saving, printing, and scanning again for this new QR Code. This time name the file "Initials" QRCodeURL. (one word)
 - i. What do you see as the url listed?
 - d. Now click on the link.
 - i. Now What did you see?
11. You can do this process for text messages, phone, numbers, contactes, etc. but we will forgo these actions at this time.

Exercise 3: Placing text into a picture image

1. Use your browser (Chrome preferred) to go to the following web site:

<https://manytools.org/hacker-tools/steganography-encode-text-into-image/>

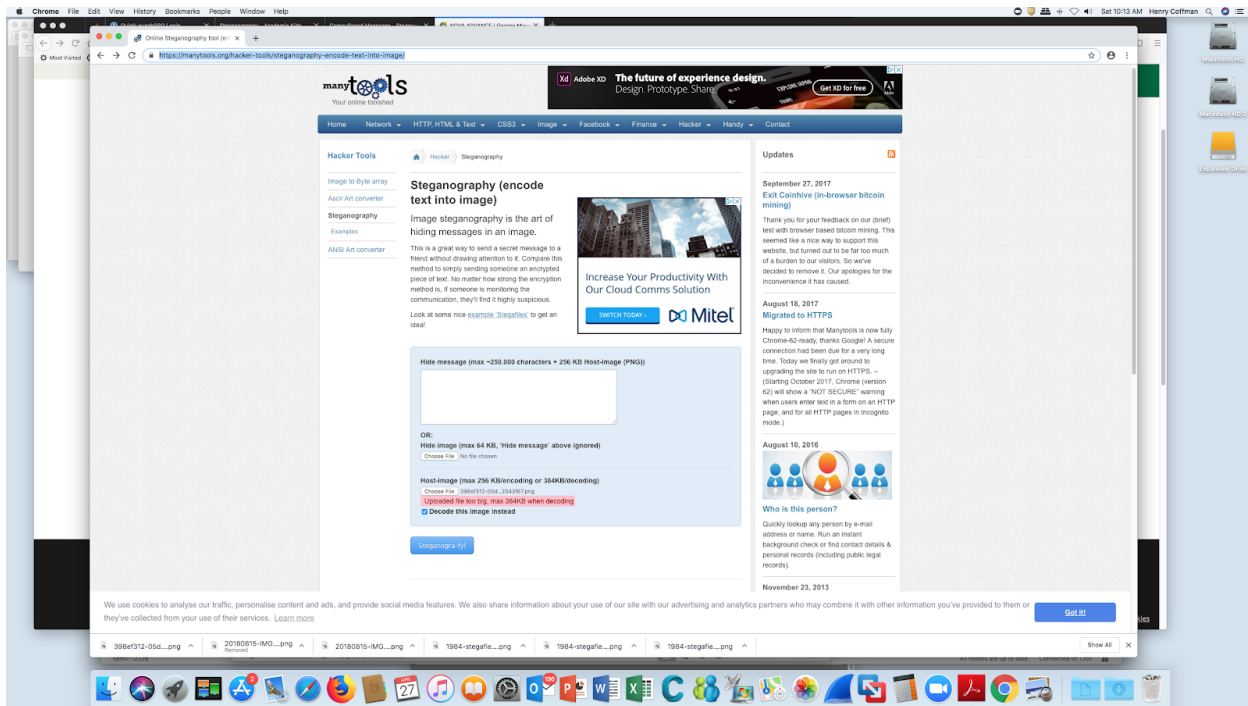
2. You should open up to the following web page as shown below:



3. Since the free tools require size limitations, we can only do small size message text and carrier images. Understand that professional and more advanced tools can accommodate longer messages and more complex carriers. You shall see some larger hiding in upcoming samples.
4. In this exercise, you will enter a very simple message to be hidden in a picture so that most people will not suspect anything is there but the picture.
 - a. In the Hide Message box, type “**CyberGirls**” of which this becomes your hidden message. This implies that you want to send a message about CyberGirls for no one to see except the receiver.
 - b. The OR area will not be used unless we are actually hiding an image inside of another image.
 - c. In the Host-Image area, click on Choose File and a dialog box will open up
 - i. Look for the Outreach folder and select the file “**Avengers**”



- ii. You should see the file name pop up next to the “Choose File”
 - iii. Click on **steganogra-fy** button.
 - d. The file will show up on the next screen and click the **download** button. (It will be at the bottom tab in Chrome just as in the previous exercise.) Save it to the download folder (Default is the Download folder anyway).
5. Now let’s decode your encoded image back to get the original message.
 6. Go back to the original screen by clicking on the **steganography** tab.



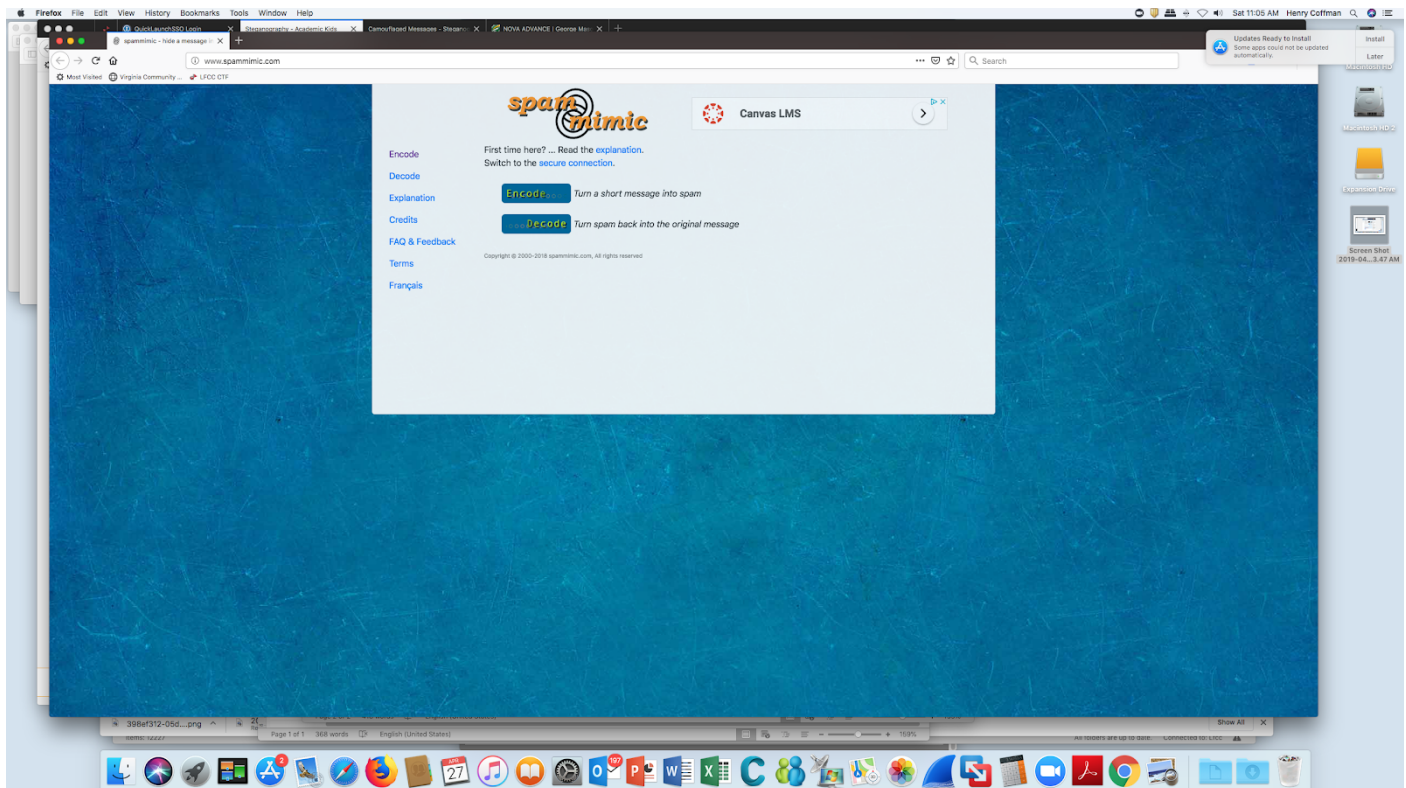
7. Under Host image, choose the saved file from step 4d (your download folder). Check the “**decode the image...**” box and click on “**Steganogra-fy**” . You should see the “Cyber Girls” message in the box.
8. Summary: You hid a small text message inside of a small size image of which, unless you are very astute, did not see.

Exercise 4: Hiding text in different formats besides an image

1. In this exercise, you will extend the techniques given in Exercise 3. Here you will hide a message of a longer length into a different format which will confuse the standard reader into thinking this is nothing more than an email or spreadsheet, etc. The technique, although called spamming here, is actually steganography used to hide things in emails and or attachments to emails.
2. Open your browsers again (if not already opened) to the following url:

<http://www.spammimic.com/>

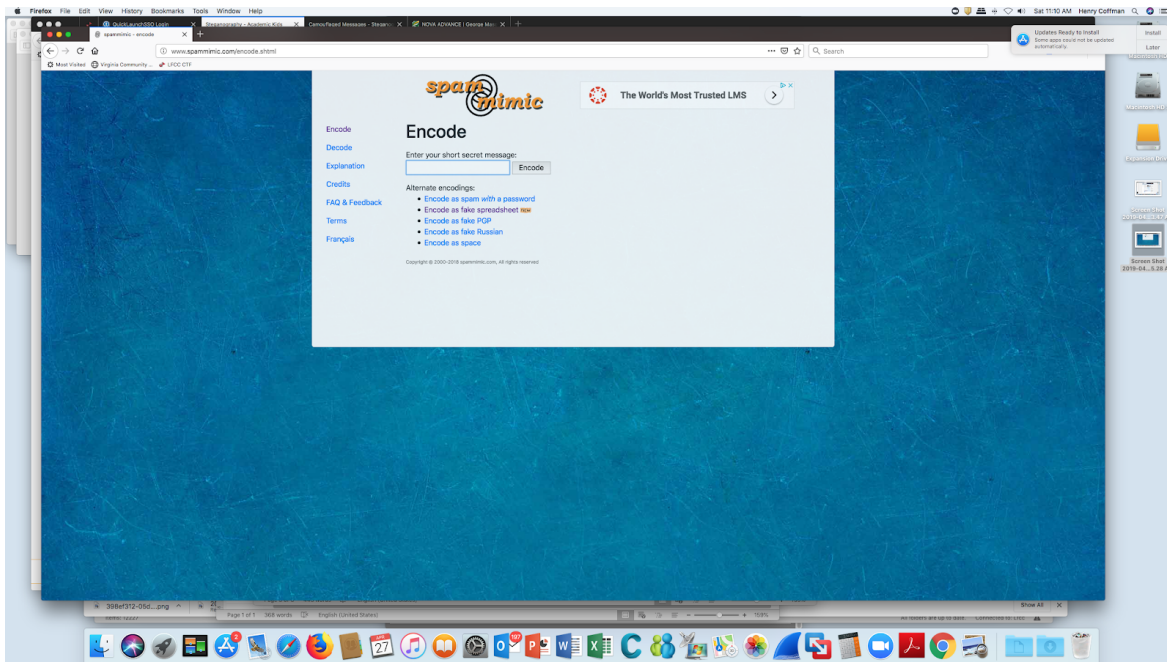
3. You should see the following screen:



4. Click on the Explanation link on the left which will explain some basic details of this product. As you will notice most of this is meant to give illustrations and not meant for complete protection. Therefore, you will only do some simple actions within these categories so given.
5. Click on the back arrow to get back to the original encode/decode screen showing both buttons
 - a. We will forgo the secure connection here.

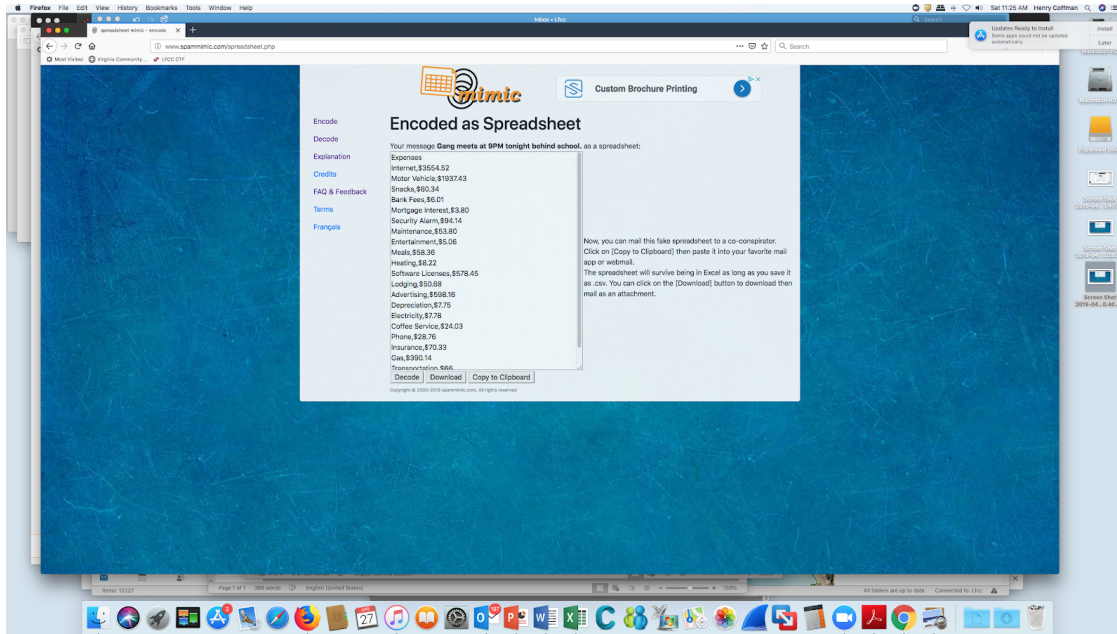
(What does this mean anyway?)

6. Click on the **encode** button to get the following screen.

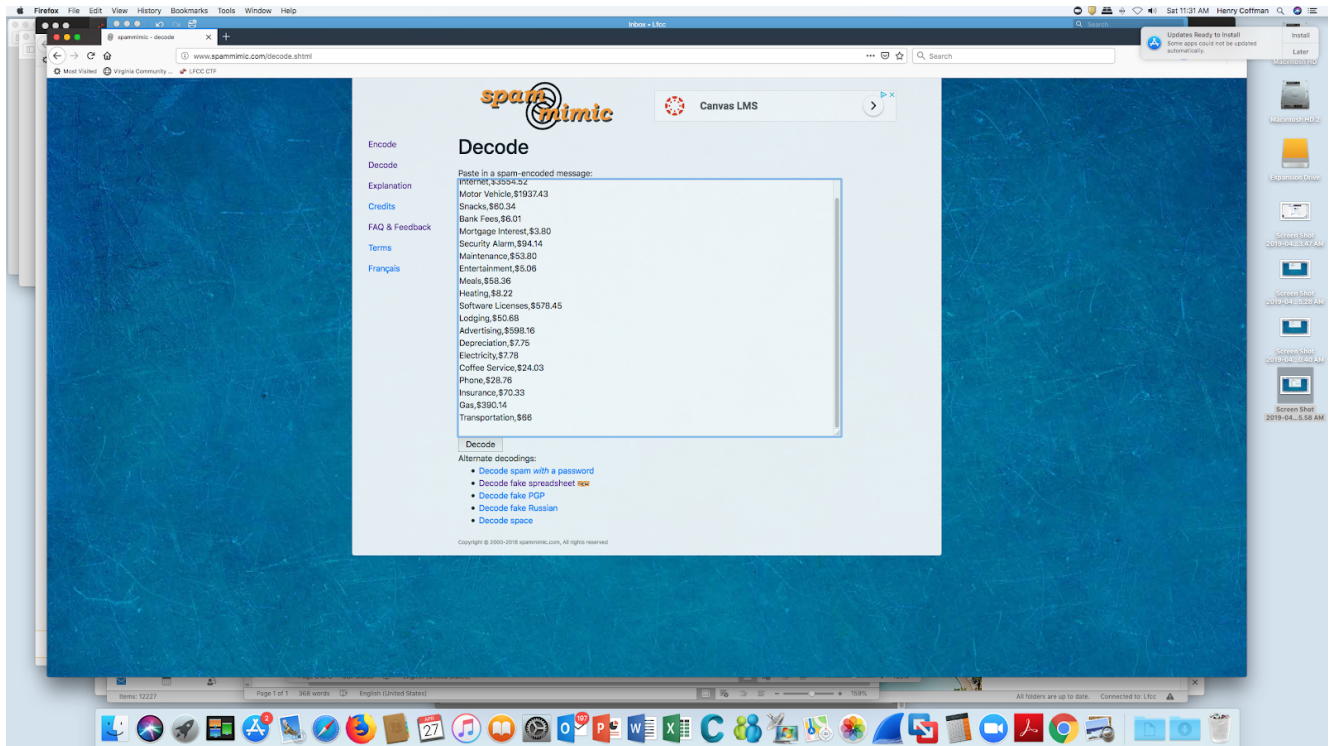


7. Let's encode the message into a spreadsheet format so people will think that it is a spreadsheet when it is really not...it's a fake spreadsheet.

- a. Click on the line **“Encode as a fake spreadsheet.”**
- b. Enter **“Gang meets at 9PM tonight behind school.”**
- c. Encode this message.
- d. You should see a spreadsheet similar to the screenshot below:



8. You can download it or copy it to another place and use it in an email or as an attachment. However, you will not do that this time. You will take a simple approach for this exercise.
9. Copy the data in the screen from top to bottom to save it in memory. Instructor will show you how to do this. (e.g., Select items and copy to clipboard)
10. Click on **Decode** in the left column and then click on the **Decode with fake spreadsheet**.
11. Paste the spreadsheet from memory into the blank area. (Right Click on mouse and select "Paste".) See screenshot below:



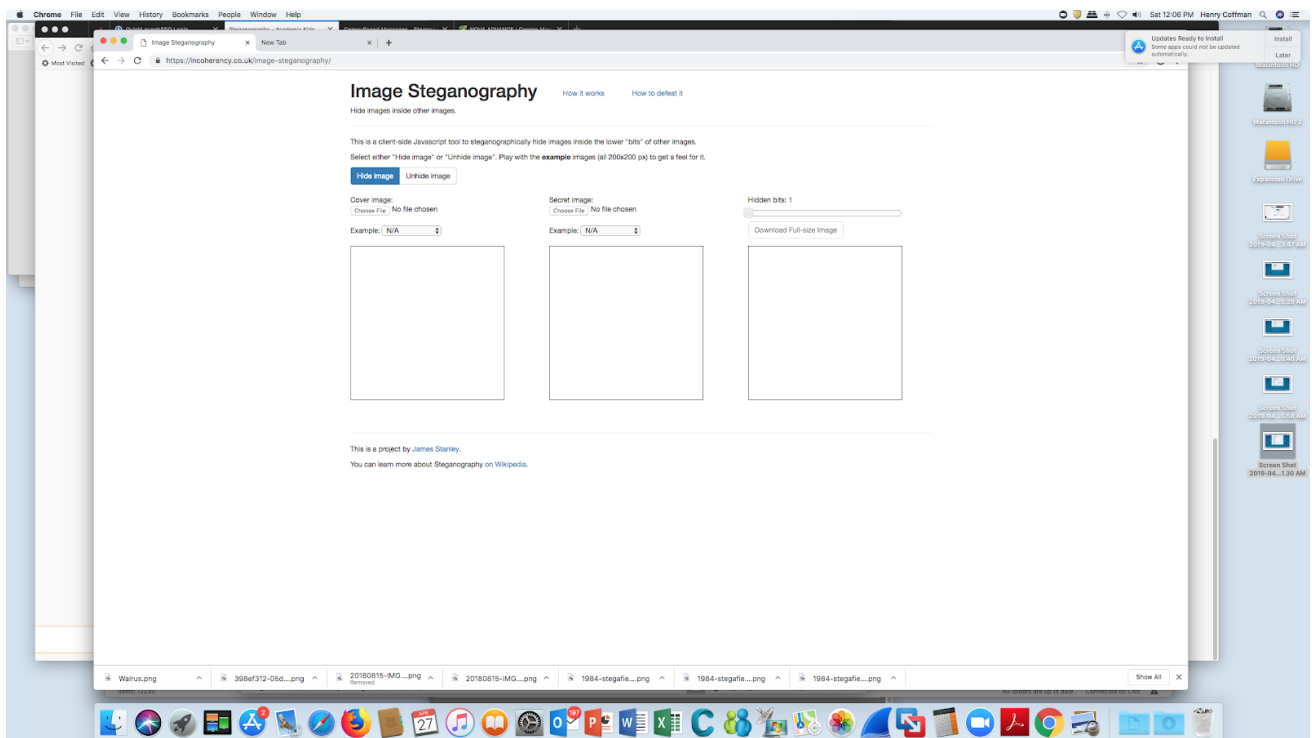
12. Click on **decode**. You should see the original message return.
13. You can try the other categories (e.g., with a password, PGP, space, Russian) if time permits but most of these require specific steps to achieve the desired outcome.

Exercise 5: Hiding an image into another image through examples (Simple technique.)

1. In this exercise, you are going to just get a feel of the simple process of steganography hiding an image into another image. You are given choices of images to use as the carrier and the message type. There is no message for you to construct since you will just use what is given. This is noted as image steganography.
2. Open your browser to the following link. (It defaults to Hide Image.)

<https://incoherency.co.uk/image-steganography/>

3. The screen should now look like this. (Default setup is “Hide Image”.)



4. Under the Cover Image, use the example list and select one of your choosing. Do the same for the secret image in the middle block.
5. The right block contains the combination of both images of which the cover image is the predominate one.
6. Slide the set bits from the left up to the end on the right.
 - a. What do you see? Why is this happening?
7. Now set the bits to 2. (Default is 1 before the slide.)
8. Save the image to the download folder. (if you are asked for a file name, use you initials + a name you like. If not just leave as default.)
9. Change Hide Image to Unhide image. (Select tab to right of Hide Image).

- a. Choose the file from your downloads folder. (If the default name was used, it is most likely download.png).
- b. Above the right block change the bits to the same number as the save (In this case, 2). Why?
 - i. The default is 1 so why can this not be used? Why is the image not clear?
- c. You should now see the complete hidden image.

Clean Up Work

1. Go to the download folder and delete all of the files used in the exercises.
2. On an iMac, Highlight all files with a “shift C “or “command A” .
3. Click the gear when in the icon bar above the files and select Move to Trash. “Command+Delete” should work as well.