

**UNCA CSCI 107**  
**Ordinary Exam 1**  
30 March, 2016

This is a closed book and closed notes exam. It is to be turned in by around 6:00 PM. That will give you enough time for the practical.

Communication with anyone other than the instructor is not allowed during the exam. Calculators may be used during this exam, but cell phones and any other electronic or communication devices may not.

Name: \_\_\_\_\_

**Problem 1 (8 points) Encryption 1**

Public key cryptography involves the use of two keys, the public key and the private key. Suppose both Jekyll and Hyde have both public and private keys. How are these keys used when Jekyll sends a secret message to Hyde?

**Problem 2 (7 points) Encryption 2**

Why do security experts (and major corporations) go years without changing their public and private keys, but we have to change our UNC Asheville email password every three months?

**Problem 3 (10 points) Why hue?**

What is hue and how is it detected by our eyes?

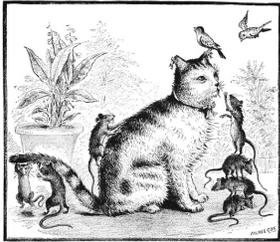
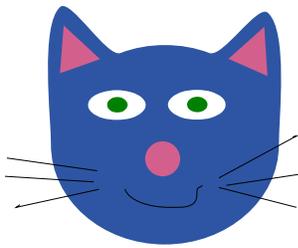
**Problem 4 – Images and Cats (35 points)**

There is an image of a cat (obtained from Wikimedia Commons) in each of the following five rows. For each image, describe an appropriate image format for storing the image.

Be sure to explicitly mention if the image should be stored in raster or **vector** form, even if that choice is implied by the image format. (The order is purely alphabetical.)



*The eyes are different colors.*

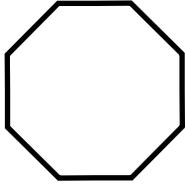


*It is a painting of musical cats*



**Problem 5 (10 points)**

Using the Snap! blocks from the handout, write a little Snap! program to draw an octagon (stop sign outline) similar to the following. However, this time you must use no more than six blocks: **Use the repeat.** (The angle is  $45^\circ$ .)

**Problem 6 (6 points)**

How many values can be encoded using 6 bits?

**Problem 7 (6 points)**

If you want to encode 100 possible values, how many bits are needed.

**Problem 8 (18 points)**

How many pixels are required to encode an 500x800 image?

If each pixel is encoded in 16 bits, how many bits are required to store the image?

If the image is stored in a file, what is the size of the file in kilobytes?