**Problem 1:  
Explanation:** For individual steps in the DES process, I heavily used the code provided online and in the lecture notes. These provided such functions as turning the 8 raw bytes into 56 DES bits, and those bits into 16 round keys, as well as the arrays for the E-step, S-step, and P-step. Besides that, I abstracted the cipher heavily, down to the encryption round level and a separate isolated Feistel function. I found this necessary to track bitvectors through the process while trying to debug the encryption.

**Encrypted:** 

**Decrypted:**In the unforgiving world of Formula One, Lewis Hamilton abides at the top. He's the man to beat, the top earner, the most important voice, the most prominent figure - a Black man alone at the summit of motorsports' highest echelon. England's knight in Mercedes armor. Over the past 15 years, the 36-year-old Briton has won seven world championships, tying the record set by Ferrari's Michael Schumacher - the German F1 driver who was regarded as the greatest of all time until Hamilton broadsided him from that perch. At Sunday's Russian Grand Prix, Hamilton rallied through a late rain shower to claim the checkered flag on the way to becoming the first driver in the sport's history with 100 career victories. And that's besides his 100 career pole positions. As achievements go in racing, this is beyond otherworldly.

(Followed by two null bytes)

**Problem 2:**

**Explanation**: This script used almost the exact same code (encryption algorithm especially) from Problem 1, but there were a few adjustments as needed to process an image. Most notably: instead of writing the entire file’s information to a single textstring, or even a single BitVector, I wrote every block separately to the output ppm. This required me to pass the filepointer object as an argument to encrypt method. For unknown reasons this worked much better. Besides that, it was mostly just a matter of changing modes to rb/wb.

Plain Image

Graphical user interface, website

Description automatically generated  
Encrypted Image:

Graphical user interface

Description automatically generated