

NT-Cryptography  
 MAT4930 2H22      **Class-X**      Prof. JLF King  
 MAT6932 21BH      Wednesday, 06Apr2016

**X5:**                     155pts

Please *fill-in* every *blank* on this sheet.

**Total:**                     155pts

Please PRINT your *name* and *ordinal*. Ta:

Ord: \_\_\_\_\_

**X5:** Show no work. Write DNE in a blank if the described object does not exist or if the indicated operation cannot be performed.

**a** Bitstring "0001000101111111101101001", via the Elias code, decodes to \_\_\_\_\_,  
 a sequence of *natnums* [hint: gun-blip-blip], followed by noise-bits \_\_\_\_\_.  
 Conv, Elias(84)= \_\_\_\_\_ (bitstring)

**b** Using dictionary 0:  $\epsilon$ , 1: "1", 2: "0", compute EnZiv(11001010)= \_\_\_\_\_,  
 in  $\langle 7 \rangle 1 \langle 34 \rangle 0 \dots$  notation. In bits, EnZiv(11001010) is \_\_\_\_\_.

**c** Bits 01001010100100001110001101101100111 decode in Idx-form, e.g  $\langle 7 \rangle 1 \langle 3 \rangle 1 \langle 9 \rangle 0 \dots \langle 3 \rangle 1 \langle 0 \rangle \langle 4 \rangle$ , to \_\_\_\_\_.  
 As 15 bits, it is \_\_\_\_\_  
 having used Ziv seeded with  $\langle 0 \rangle = \epsilon$ ,  $\langle 1 \rangle = '1'$ , and  $\langle 2 \rangle = '0'$ .  
 Employing our fivebit-code, the 15 bits decode to symbols \_\_\_\_\_.

**d** Consider  $\mathbf{p} := (.11, .14, .16, .19, .40)$ , a probability-vector. Give an estimate for distropy  $\mathcal{H}(\mathbf{p}) \approx$  \_\_\_\_\_  
 as a decimal. A length-tuple  $\vec{\ell}$  [satisfying the binary Kraft Inequality] whose (binary)-ECL barely exceeds this distropy is  $\vec{\ell} = ($  \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_).  
 Its  $\mathbf{p}$ -ECL is precisely \_\_\_\_\_.

HONOR CODE: "I have neither requested nor received help on this exam other than from my professor."

Signature: \_\_\_\_\_