

L27Q1	Stereo audio is sampled at 44.1 kHz and quantized to 16 bits/channel and then compressed to 128 kbps mp3 playback format. What are the approximate DCR and the resulting savings?	DCR=11 Savings=91%																	
L27Q2	A picture of a samurai was saved as a 24-bit samurai.bmp (full size, 2188 kB) and a 31 kB samurai.png. Estimate the DCR and savings from the PNG compression.	Savings=98.6%																	
L27Q3	Why was the cartoon samurai picture highly compressible? <i>Very simple with large areas of few colors.</i>																		
L27Q4	Can we expect to achieve such DCR with the photograph? <i>No, if we use lossless compression. Maybe, if we use lossy compression. Depends on details of photo and how much fidelity you are willing to lose.</i>																		
L27Q5	What was the relative frequency (probability) of someone ordering the menu's #1 sandwich selection (we call this p_1)?	18/50																	
L27Q6	What is the fewest number of bits needed to encode each of 8 possible orders with a unique (and unambiguous) bit sequence of equal length for each?	3	bits																
L27Q7	What is the entropy of one order given the popularity statistics above?	2.195	bits																
L27Q8	Create a Huffman tree based on the order statistics given above.																		
L27Q9	Complete the table above with Huffman codes from the tree above.																		
	<table border="1"> <thead> <tr> <th>#1</th> <th>#2</th> <th>#3</th> <th>#4</th> <th>#5</th> </tr> </thead> <tbody> <tr> <td>18</td> <td>9</td> <td>8</td> <td>10</td> <td>5</td> </tr> <tr> <td>11</td> <td>00</td> <td>101</td> <td>01</td> <td>100</td> </tr> </tbody> </table>	#1	#2	#3	#4	#5	18	9	8	10	5	11	00	101	01	100			
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L27Q10	Which menu items does not appear in the sequence 1110001010100?	#4																	
L27Q11	What is the average bit length per sandwich order?	2.75	bits																
L27Q12	How does the average bit length compare to entropy?	larger																	