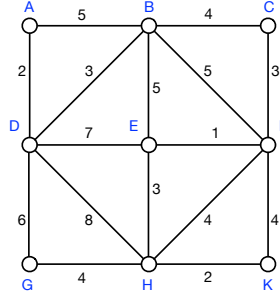


Homework Assignment 06:

1. Apply the Kruskal's Algorithm to find the minimum spanning tree of the undirected weighted graph **below**.



2. Apply the Prim's Algorithm to find the minimum spanning tree of the undirected weighted graph **above**.
3. A data file of 100k characters contains only the characters $\{a, b, c, d, e, f\}$, with frequencies given below.

a	b	c	d	e	f
45k	13k	12k	16k	9k	5k

- A) If we use a fixed-length code, how many bits are required to represent these 100k characters? B) Construct a Huffman code for these for symbols. C) How many bits are required to represent these 100k characters using the Huffman code? D) Show the encoding and decoding steps of the following text: **deaddeafbaad**.
4. Assume that the word-size of a computer (the data path width of the processor and the ALU) is 4 bits. In other words, every word is a hexadecimal digit. Convert the following decimal numbers into hexadecimal, and then perform a multi-word addition to compute their sum: $X = 3^{23}$ and $Y = 5^{16}$. You may use Mathematica, Python or bc for conversion, however, perform the addition using pencil-and-paper algorithm.
 5. Given the hexadecimal numbers $X = 17179149$ and $Y = 4546B3DB$. Find their product using A) the regular divide-and-conquer algorithm, B) the Karatsuba divide-and-conquer algorithm.

Due 5pm Wednesday, March 4

Either, email an electronic copy to the Instructor (koc@cs.ucsb.edu) or the TA (zhijing@cs.ucsb.edu). Or, deliver a paper copy to the HW Box in HFH 2108. Electronic copy of your homework or lab report can be in Text, PDF or MS Word, or Open Office format. You could also scan/pdf your handwritten work; however, do not send phone-camera images under any circumstances!