1. One method of reducing bandwidth use is to compress the data being transmitted. Let A = {a/20, b/15, c/5, d/15, e/45} be the alphabet and its frequency distribution. Use Huffman coding algorithm to compute the optimal coding for each character. What is the average number of bits/symbol of the codes?

a = 20

b = 15

c = 5

d = 15

e = 45

* total frequency = 100 ( add all the frequency distributions up)

probabilities:

a = 0.20

b = 0.15

c = 0.05

d = 0.15

e = 0.45

* sort list in ascending order

c = 0.05

b = 0.15

d = 0.15

a = 0.20

e = 0.45

* Combine c and b

cb = 0.2

d = 0.15

a = 0.20

e = 0.45

* Sort again

d = 0.15

cb = 0.2

a = 0.20

e = 0.45

* Combine d and a

cb = 0.2

da = 0.35

e = 0.45

* Sort again

cb = 0.2

da = 0.35

e = 0.45

* Combine cb and da

e = 0.45

cbda = 0.55

* e(45) + cbda(55) = root(100)
* Binary codes

E =0

C = 100

B = 101

D =110

A = 111