**Exercise 4.3 (2)**

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| %%%Exercise 4.3(2) part  pp=[8.4,1.5,2.2,4.2,11,2.2,2.0,6,7.4,0.1,1.3,4,2.4,6.7,7.4,1.9,0.1,7.5,6.2,9.2,2.7,0.9,2.5,0.1,2,0.1];  A='a':'z';  AA=mat2cell(A,1,ones(26,1));  AAA=[];  %sort probabilities and record the index  [pp0,pindex]=sort(pp,'descend');  %generate codewords  code={'0','1','00','01','10','000','11','001','010','100','0000','011','101','110','0001','0010','0100','1000','00000','111','0011','0101','0110','1001','1010','1110'};  %combine symbols and codewords  for i=1:26  AA(2,pindex(i))=cellstr([cell2mat(code(i)),'\_']);  end  %expected length  Sum=0;  for i=1:26  Sum=Sum+pp(i)\*length(cell2mat(AA(2,i)));  end  Sum=Sum/100;  %expected time  time=0;  for i=1:26  t0=2\*length(find(cell2mat(AA(2,i))=='0'));  t1=4\*length(find(cell2mat(AA(2,i))=='1'));  time=time+pp(i)/100\*(t0+t1);  end  time=time+3 |

**Exercise 4.3 (3)**

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| pp=[8.4,1.5,2.2,4.2,11,2.2,2.0,6,7.4,0.1,1.3,4,2.4,6.7,7.4,1.9,0.1,7.5,6.2,9.2,2.7,0.9,2.5,0.1,2,0.1];  Sum=0;  for i=1:26  p=pp(i)/100;  Sum=Sum+p\*log(1/p);  end  Sum |