1. **Recall our dynamic programming algorithm for computing the maximum-weight independent set of a path graph. Consider the following proposed extension to more general graphs. Consider an undirected graph with positive vertex weights. For a vertex v, obtain the graph G′(v) by deleting v and its incident edges from G, and obtain the graph G′′(v) from G by deleting v, its neighbors, and all of the corresponding incident edges from G. Let OPT(H) denote the value of a maximum-weight independent set of a graph H. Consider the formula OPT(G)=max{OPT(G′(v)),wv+OPT(G′′(v))}, where v is an arbitrary vertex of G of weight wv. Which of the following statements is true?**
2. **Which of the following is true for our dynamic programming algorithm for computing a maximum-weight independent set of a path graph? (Assume there are no ties.)**
3. **Which of the following statements holds for Huffman’s coding scheme?**
4. **Under a Huffman encoding of n symbols, how long (in terms of number of bits) can a codeword possibly be?**
5. **Consider an alphabet with five letters, {a,b,c,d,e}, and suppose we know the frequencies fa=0.32, fb=0.25, fc=0.2, fd=0.18, and fe=0.05. What is the expected number of bits used by Huffman’s coding scheme to encode a 1000-letter document?**

Solution : 2230

a:0.32, b:0.25, c:0.2, de:0.23  
a:0.32, b:0.25, cde: 0.43  
ab: 0.57, cde: 0.43  
abcde  
a:00, b:01, c:10, d: 110, e:111  
0.322 + 0.252 + 0.22 + 0.183 + 0.053 = 2.232.231000 = 2230