

Lecture Section:

Monday, Nov 03, 2025

Student Name:

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1. (2 pts.) In Huffman encoding, the symbol with the minimum frequency gets the least number of bits.

- a True
- b False

Answer (b)

2. (2 pts.) Using Huffman encoding, how many bits (0 or 1) are needed to store the 20-symbol string represented by the following table of symbols and frequencies?

Symbol	Frequency
A	10
B	4
C	2
D	4

- a 18
- b 34
- c 36
- d 38

Answer 18

An example encoding is:

A: 0, B: 10, C: 110, D: 111

Which gives bit count $10 \cdot 1 + 4 \cdot 2 + 2 \cdot 3 + 4 \cdot 3 = 36$

3. (2 pts.) Huffman encoding does which of the following?

- a Encodes the input data
- b Compresses the input data
- c All of the above

Answer All of the above

Huffman encoding both rewrites the input in a new alphabet (encoding) and reduces the number of bits the input string takes up (compression).

4. (2 pts.) Given the Set Cover instance with items $B = \{1, 2, 3, 4, 5\}$ and sets $S_1 = \{3, 4, 5\}$, $S_2 = \{2, 4, 5\}$, $S_3 = \{1, 5\}$, $S_4 = \{1, 3\}$, what is the optimal (minimum) number of sets needed to cover all the items?

- a 1
- b 2
- c 3
- d 4

Answer 2

We can choose S_2 and S_4 to cover all the items.

5. (2 pts.) In the greedy set cover algorithm, what is the greedy choice at each step?

- a Selecting largest set by cardinality.
- b Selecting the set that covers the fewest uncovered elements.
- c Selecting the set that covers the most uncovered elements per unit cost.
- d Selecting the smallest set by cardinality.

Answer: (b) Selecting the set that covers the most uncovered elements per unit cost.