

Max-SAT Approximation

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Problem 1

$$4 \cdot \frac{7}{8} = \frac{7}{2} = 3.5 \quad (1)$$

Problem 2

There is a truth assignment that satisfies all the clauses.

Problem 3

By setting $x_1 = T$, the clauses involving x_1 reduce to

$$\begin{aligned} x_1 \vee x_2 \vee \bar{x}_4 &= T \\ x_1 \vee \bar{x}_2 \vee x_3 &= T. \end{aligned}$$

The other 2 clauses remain unchanged. Then the expected number of clauses we can satisfy is given by

$$1 + \frac{7}{8} + 1 + \frac{7}{8} = 3 + \frac{3}{4} = 3.75 \quad (2)$$

Problem 4

By setting $x_1 = F$, the clauses involving x_1 reduce to

$$\begin{aligned} x_1 \vee x_2 \vee \bar{x}_4 &= x_2 \vee \bar{x}_4 \\ x_1 \vee \bar{x}_2 \vee x_3 &= \bar{x}_2 \vee x_3. \end{aligned}$$

The other 2 clauses remain unchanged. Then the expected number of clauses we can satisfy is given by

$$\frac{3}{4} + \frac{7}{8} + \frac{3}{4} + \frac{7}{8} = \frac{13}{4} = 3.25 \quad (3)$$

Problem 5

True