# Max-SAT Approximation

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## Problem 1

$$4 \cdot \frac{7}{8} = \frac{7}{2} = 3.5 \tag{1}$$

## Problem 2

There is a truth assignment that satisfies all the clauses.

## Problem 3

By setting $x_1 = \mathrm{T}$, the clauses involving $x_1$ reduce to

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

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

$$1 + \frac{7}{8} + 1 + \frac{7}{8} = 3 + \frac{3}{4} = 3.75 \tag{2}$$

## Problem 4

By setting $x_1 = \mathrm{F}$, the clauses involving $x_1$ reduce to

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

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

$$\frac{3}{4} + \frac{7}{8} + \frac{3}{4} + \frac{7}{8} = \frac{13}{4} = 3.25 \tag{3}$$

## Problem 5

True