Answer on Question #66812 - Math - Calculus

Question: Give all the extreme points of the set

$$S = \{(x, y) \mid 2x + 3y \leq 6, -3x + 2y \leq 6, -5x - 6y \leq 30, 4x - 2y \leq -24\}.$$

Answer: There are no extreme points because the set is empty**.**

Solution: Indeed, in order to find points (x, y) which belong to the set S, we have to solve the system of inequalities:

$$\begin{cases} 2x + 3y \leq 6, \\ -3x + 2y \leq 6, \\ -5x - 6y \leq 30, \\ 4x - 2y \leq -24. \end{cases}$$

We multiply the second inequality of the system by 9 and the fourth one by $\frac{15}{2}$:

$$\begin{cases} 2x + 3y \leq 6, \\ -27x + 18y \leq 54, \\ -5x - 6y \leq 30, \\ 30x - 15y \leq -180. \end{cases}$$

Adding all four inequalities, we get $0 \leq -90$. This numerical inequality is incorrect. Therefore, the set S is empty and it doesn't have any extreme points.