Determine the value of the variables that will obtain constrained local minima of the following functions using the analytical method (based on KT conditions) by using the relevant MATLAB programs.

1. $f(x_1, x_2) = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$
Subject to $x_1 + x_2 = 4$

2. $f(x_1, x_2) = 9x_1^2 + 18x_1x_2 + 13x_2^2 - 4$
Subject to $x_1^2 + x_2^2 + 2x_1 = 16$

3. $f(x_1, x_2) = (x_1 - 1)^2 + (x_2 - 1)^2$
Subject to $x_1 + x_2 - 4 = 0$

4. $f(x_1, x_2) = 2x_1 + 3x_2 - x_1^3 - 2x_2^2$
Subject to $x_1 + 3x_2 \le 6$
$5x_1 + 2x_2 \le 10$

5. $f(x_1, x_2) = 4x_1^2 + 3x_2^2 - 5x_1x_2 - 8x_1$
Subject to $x_1 + x_2 \le 4$

6. $f(x_1, x_2) = x_1^2 + x_2^2 - 4x_1 - 2x_2 + 6$
Subject $4 - x_1 - x_2 \le 0$

7 $f(x_1, x_2) = 2x_1^2 - 6x_1x_2 + 9x_2^2 - 18x_1 + 9x_2$
Subject $x_1 + 2x_2 \le 10$
$4x_1 - 3x_2 \le 20$

8 $f(x_1, x_2) = 9x_1^2 - 18x_1x_2 + 13x_2^2 - 4$
Subject to $16 - x_1^2 - x_2^2 - 2x_1 \le 0$

9 $f(x_1, x_2) = (x_1 - 3)^2 + (x_2 - 3)^2$
Subject to $x_1 + x_2 \le 4$
$x_1 - 3x_2 = 1$

10 $f(x_1, x_2) = x_1^3 - 16x_1 + 2x_2 - 3x_2^2$
Subject to $x_1 + x_2 \le 3$