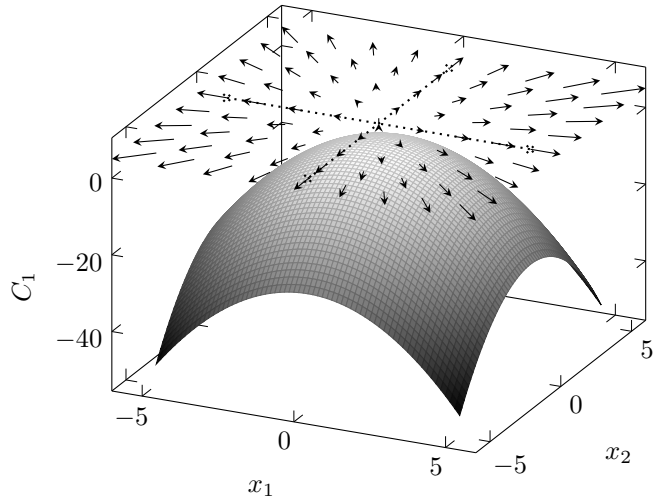


Figure 1: Two variable quadratic function $C_1(x_1, x_2)$.

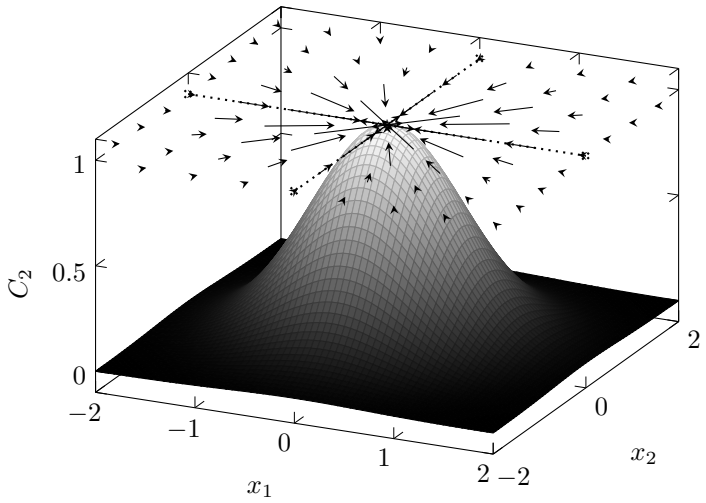


Figure 2: Two variable Gaussian function $C_2(x_1, x_2)$.

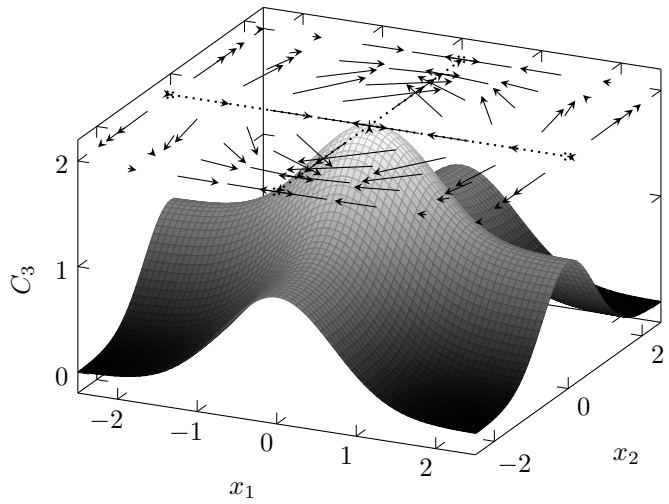


Figure 3: Modified version of Gaussian function $C_3(x_1, x_2)$.

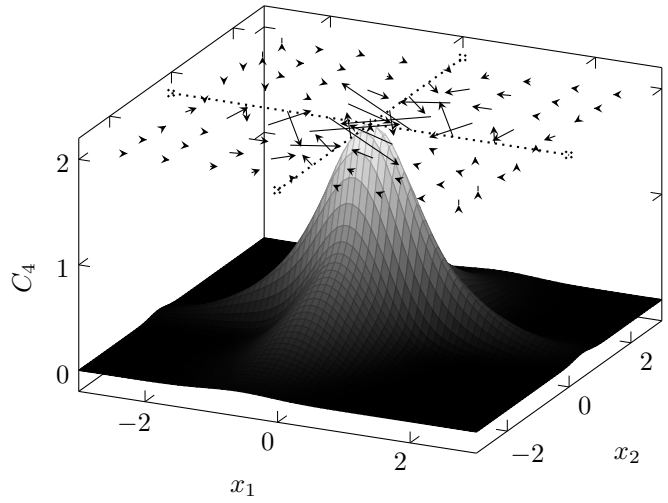


Figure 4: The proposed function $C_4(x_1, x_2)$ for $P = \begin{bmatrix} 0.448 & 0.308 \\ 0.308 & 0.338 \end{bmatrix}$ and $Q = \begin{bmatrix} 1.329 & -0.493 \\ -0.493 & 2.761 \end{bmatrix}$.

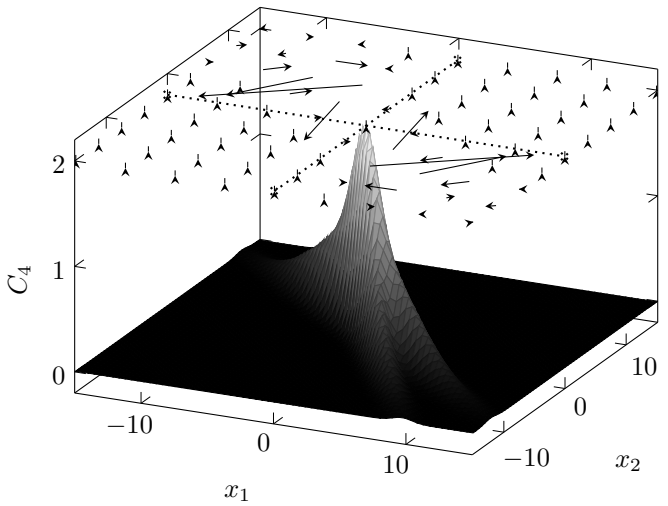
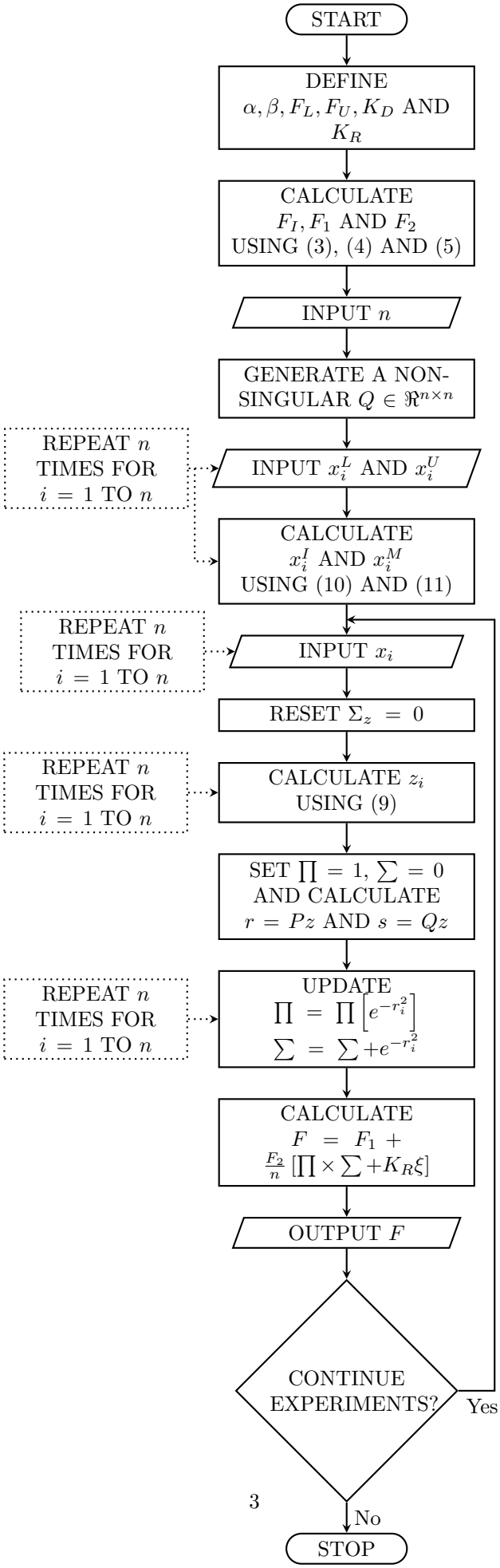


Figure 5: The proposed function $C_4(x_1, x_2)$ for $P = \begin{bmatrix} 0.1 & 0 \\ 0 & 0.1 \end{bmatrix}$, $Q = \begin{bmatrix} 0.979 & 0.636 \\ 0.636 & 0.773 \end{bmatrix}$.


START
DEFINE $\alpha, \beta, F_L, F_U, K_D$ AND K_R
CALCULATE F_I, F_1 AND F_2 USING (3), (4) AND (5)
INPUT n
GENERATE A NON-SINGULAR $Q \in \Re^{n \times n}$
REPEAT n TIMES FOR $i = 1$ TO n
INPUT x_i^L AND x_i^U
CALCULATE x_i^I AND x_i^M USING (10) AND (11)
REPEAT n TIMES FOR $i = 1$ TO n
INPUT x_i
RESET $\Sigma_z = 0$
REPEAT n TIMES FOR $i = 1$ TO n
CALCULATE z_i USING (9)
SET $\prod = 1, \sum = 0$ AND CALCULATE $r = Pz$ AND $s = Qz$
REPEAT n TIMES FOR $i = 1$ TO n
UPDATE $\prod = \prod \left[e^{-r_i^2}\right]$ $\sum = \sum + e^{-r_i^2}$
CALCULATE $F = F_1 + \frac{F_2}{n} [\prod \times \sum + K_R \xi]$
OUTPUT F
CONTINUE EXPERIMENTS?
Yes
No
STOP

Select number of factors

2

Reset

Select the upper and lower limits

Factor	Lower limit	Upper limit
pH	1	13
Temperature	0	100

Modify factors/limits

Perform individual experiment/measure distance from optimum value (validate optimum value)

Factor	Value
pH	7.036116534
Temperature	39.66737

Calculate response | Is optimum

Response= 257.4002153

Perform bulk experiments

```
7.036116534     39.66737
10.03611653     14.66737
10.03611653     64.66737
7.036116534     39.66737
```

Save results to clipboard | Save results to a file

Figure 7: Screenshot of the application.

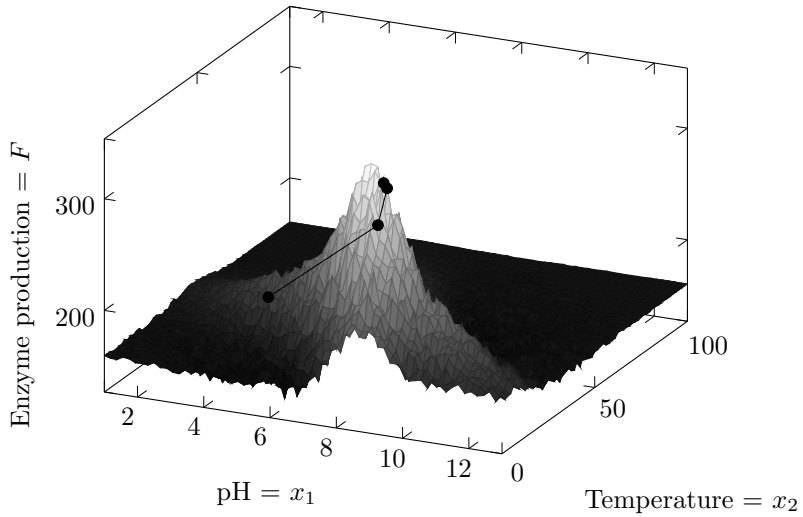


Figure 8: Surface plot of F with the constants given in Section 6 superimposed with the RSM results.

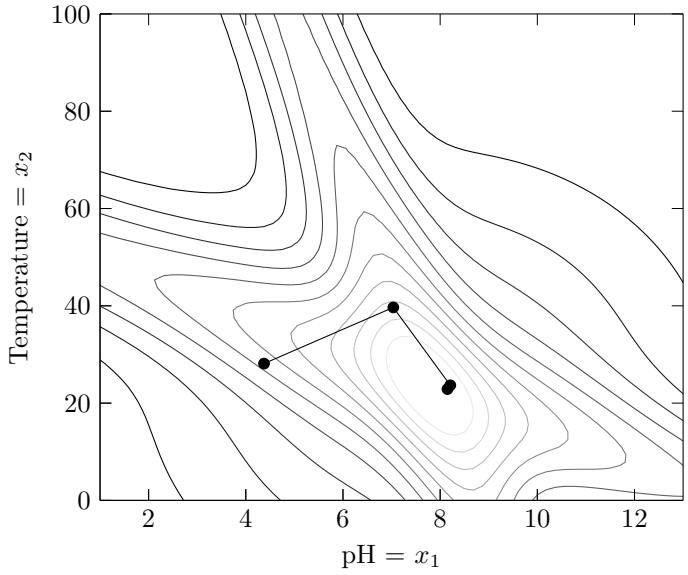


Figure 9: Contour plot of F with $K_R = 0$ and the other constants given in Section 6 superimposed with the RSM results.

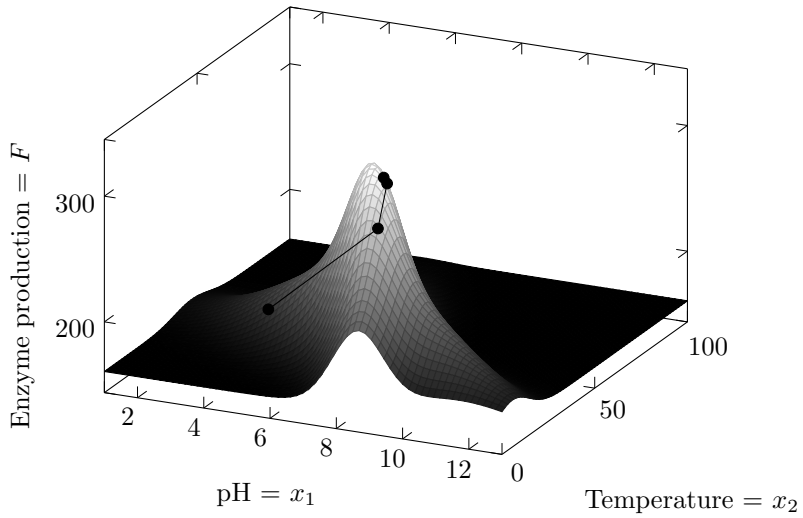


Figure 10: Surface plot of F with $K_R = 0$ and the other constants given in Section 6 superimposed with the RSM results.