

## Schwefel's Problem 2.22 (F7)

$$F7(x) = \sum_{i=1}^n |z_i| + \prod_{i=1}^n |z_i|, z = x - o$$

**Properties:**  $x \in [-10, 10]^D$ ,  $F7(x^*) = 0$ .

## Schwefel's Problem 1.2 (F8)

$$F8(x) = \sum_{i=1}^n \left( \sum_{j=1}^i z_j \right)^2, z = x - o$$

**Properties:**  $x \in [-65.536, 65.536]^D$ ,  $F8(x^*) = 0$ .

## Extended $f_{10}$ (F9)

$$F9(x) = f_{10}(z_n, z_1) + \sum_{i=1}^{n-1} f_{10}(z_i, z_{i+1}), z = x - o$$

$$f_{10}(x, y) = (x^2 + y^2)^{0.25} \cdot [\sin^2(50 \cdot (x^2 + y^2)^{0.1} + 1)]$$

**Properties:**  $x \in [-100, 100]^D$ ,  $F9(x^*) = 0$ .

## Bohachevsky (F10)

$$F10(x) = \sum_{i=1}^{n-1} (z_i^2 + 2z_{i+1}^2 - 0.3 \cos(3\pi z_i) - 0.4 \cos(4\pi z_{i+1}) + 0.7), z = x - o$$

**Properties:**  $x \in [-15, 15]^D$ ,  $F10(x^*) = 0$ .

## Schaffer (F11)

$$F11(x) = \sum_{i=1}^{n-1} (z_i^2 + z_{i+1}^2)^{0.25} \cdot [\sin^2(50 \cdot (z_i^2 + z_{i+1}^2)^{0.1}) + 1], z = x - o$$

**Properties:**  $x \in [-100, 100]^D$ ,  $F11(x^*) = 0$ .