2.

(1)

The left one (q = 0.5) encourages sparse solutions, the right one (q = 4) does not encourage sparse solutions.

For q = 0.5, the intersections of the ellipse iso-line of the square-loss and the edge of the penalty are on axis, which means the entry for the respective other axis is zero. In contrast, when q = 4, the entries are even size, not zero.

(2)

q = 0.5: x3 would achieve the smallest cost, since it is intersects the edge of the penalty and locate at the beta-2 axis.

q = 4: x4 would achieve the smallest cost, since it has the same square-loss with other x’s, while it has the smallest penalty.