$k(x, x') = x^T rev(x')$ *where* $rev(x)$ *reverses the order of the components in vector* x'

Counterexample:

Let Gram matrix with k *be* K, *nonzero vector* $v = (1, 0, 0, \ldots, 0, 0)^T (m - 1\ '0's)$

$v^T K v$

$$= \begin{pmatrix} 1 \\ \vdots \\ 0 \end{pmatrix} \begin{pmatrix} x_1^T rev(x_1) & \ldots & x_1^T rev(x_m) \\ \vdots & \ddots & \vdots \\ x_m^T rev(x_1) & \ldots & x_m^T rev(x_m) \end{pmatrix} (1, 0, \ldots, 0)$$

$= x_1^T rev(x_1)$

$= x_1^T (-x_1)$

$= -1 < 0$

Thus, $k(x, x') = x^T rev(x')$ *is not a valid kernel*.