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

$Counterexample$:

Let $Gram$ $matrix$ $with$ k be K,

$$X = \begin{bmatrix} [-1 & 1] \\ [-1 & 1] \end{bmatrix}$$

$nonzero$ $vector$ $v = [1, 0]$

$v^T K v$

$$= (1,0) \begin{pmatrix} k(x_1, x_1) & k(x_1, x_2) \\ k(x_2, x_1) & k(x_2, x_2) \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$= (1,0) \begin{pmatrix} [-1,1] \begin{bmatrix} 1 \\ -1 \end{bmatrix} & [-1,1] \begin{bmatrix} 1 \\ -1 \end{bmatrix} \\ [-1,1] \begin{bmatrix} 1 \\ -1 \end{bmatrix} & [-1,1] \begin{bmatrix} 1 \\ -1 \end{bmatrix} \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$= (1,0) \begin{pmatrix} -2 & -2 \\ -2 & -2 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$= -2 < 0$$

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