$k(x, x') = k_1(x, x') + k_2(x, x')$

$Let\ Gram\ matrix\ with\ k_1(x, x')\ be\ K_1, Gram\ matrix\ with\ k_2(x, x')\ be\ K_2.$

$K_1\ and\ K_2\ are\ positive$ semi-definite.

$Let\ Gram\ matrix\ with\ k(x, x')\ be\ K$

$K = K_1 + K_2$

$Since\ K_1\ and\ K_2\ are\ positive$ semi-definite, $for\ any\ nonzero\ vector\ u,$

$u^T K_1 u \geq 0, u^T K_2 u \geq 0$

$\rightarrow u^T K_1 u + u^T K_2 u \geq 0$

$\rightarrow u^T (K_1 + K_2) u \geq 0$

$\rightarrow u^T K u \geq 0$

$Thus, k(x, x') = k_1(x, x') + k_2(x, x')\ is\ a\ valid\ kernel.$