1. Let $S$ be the subspace of $\mathbb{R}^4$ spanned by $x_1 = (1, 0, -2, 1)^T$ and $x_2 = (0, 1, 3, -2)^T$. Find a basis for $S^\perp$. 
2. Consider the inner product space $C[0, 1]$ with

$$\langle f, g \rangle = \int_0^1 f(x)g(x)\, dx.$$ 

Determine the cosine of the angle between the functions $f(x) = 5x^2$ and $g(x) = 3x$. 