Math 260: Linear Algebra
Proofs: Proving "For All" Statements

Prove or disprove the following:

1) $\forall\ x \in [3,5]\ ,\ 4x - 1 \in [11,19]$.
2) $\forall\ x \in \mathbb{R}\ ,$ if $\cos x = 0,$ then $\sin 2x = 0$.
3) For all integers $n\ ,\ n^3 + 3n^2 + 2n + 5$ is odd.
4) $\forall\ x \in \mathbb{R}\ ,$ if $x \notin [-1,1],$ then $x(1 - x) < 0$.
5) $\forall\ x \in \mathbb{R}\ ,\ 2x^2 - 16x + 31 > 0$.
6) For all $n \in \mathbb{N}\ ,\ \frac{4n^2+4n}{2^n}$ is a natural number.