9. $(P(a) \wedge \neg Q(a)) \rightarrow R(a)$ elim ∀: 2
10. $R(a)$ MP: 8, 9
11. $\exists x R(x)$ Intro ∃: 10

6. odd × odd = odd

Let n and m both to be odd number, so that there exists an integer a for $n=2a+1$ and an integer b for $m=2b+1$ (a and b depend on n and m). So $nm=(2a+1)(2b+1)$ $=4ab+2a+2b+1=2(2ab+a+b)+1$, since a and b are integers $(2ab+a+b)$ is also an integer, so $2(2ab+a+b)+1$ is an odd number, which means nm is odd.