Take-Home Test

Ananya Cleetus

September 7, 2014

1.)

Proof. Let $a \in \mathbb{Z}$ where $a = 2k + 1$. Therefore,

$$\begin{aligned} a^2 + 3a + 5 &= 2(k+1)^2 + 3(2k+1) + 5 \\ &= 4k^2 + 4k + 1 + 6k + 3 + 5 \\ &= 4k^2 + 10k + 9 \\ &= 4k^2 + 10k + 8 + 1 \\ &= 2(2k^2 + 5k + 4) + 1 \end{aligned}$$

By the definition of odd, $a^2 + 3a + 5$ is odd

□

2.)

Proof. Let $a \in \mathbb{Z}$ where $a = 2k + 1$. Therefore,

$$\begin{aligned} a^2 + 3a + 5 &= 2(k+1)^2 + 3(2k+1) + 5 \\ &= 4k^2 + 4k + 1 + 6k + 3 + 5 \\ &= 4k^2 + 10k + 9 \\ &= 4k^2 + 10k + 8 + 1 \\ &= 2(2k^2 + 5k + 4) + 1 \end{aligned}$$

By the definition of odd, $a^2 + 3a + 5$ is odd □