3. Prove or disprove the following assertion.

For all integers $n > 3$, $\binom{n}{3}$ is even.

This is false!

For $n=7$, $\binom{7}{3} = \frac{7 \times 6 \times 5}{3 \times 2 \times 1} = 35$ which is odd.

One can observe that $\binom{n}{3} = \frac{n \times (n-1) \times (n-2)}{3 \times 2 \times 1}$ will be odd whenever $n \times (n-1) \times (n-2)$ contains only a single factor of 2, and this will occur whenever $n \bmod 4 = 3$.