Proof. 2.3.8a
Prove the sum of the squares of two odd numbers is never a square.
An odd integer can be represented by $2k + 1$.
This gives us

$$\begin{aligned}
&(2a + 1)^2 + (2b + 1)^2 \\
&4a^2 + 4a + 1 + 4b^2 + 4b + 1 \\
&2(2a^2 + 2a + 2b^2 + 2b + 1).
\end{aligned}$$

2 is a prime factor, so $2n$ cannot be a square number if n is not divisible by 2. $2a^2 + 2a + 2b^2 + 2b + 1$ can be represented by $2k + 1$. Therefore we have $2(2k + 1)$.
We also know all squares can be represented by $4k$ or $4k+1$. $2(2k+1) = 4k+2$ which can not be a square. □

Proof. 2.3.8b
Prove the product of two consecutive squares is always one less than a square.
We have

$$\begin{aligned}
&k(k + 1)(k + 2)(k + 3) \\
&k^4 + 6k^3 + 11k + 6k \\
&k^4 + 6k^3 + 11k + 6k + 1 - 1 \\
&(k^2 + 3k + 1)^2 - 1.
\end{aligned}$$

Assuming $n = k^2 + 3k + 1$ we have that the product of four consecutive numbers can be represented as $n^2 - 1$ which is one less than a square. □