Question 6

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proposition: the only prime triple is $3, 5, 7$.

proof: we prove by contradiction. and make use of the conclusion of last Question.

1.Assume there exists another prime triple, say, $n, n+2, n+4$. where n is odd and $n \neq 3$.

2. Using the conclusion of Q5, that means, at least one of $n, n+2, n+4$ has factor 3.

3. As $n \neq 3$,therefore one of $n, n+2, n+4$ has factor 3.

4. some number has a factor 3. means either it is nor a prime or it is 3.

4.1. If this number is n. $n = 3$ contradiction to $n \neq 3$

4.2. If this number is $n+2$. Either $n+2$ is not prime, contradiction, or $n+2 = 3 \Rightarrow n = 1$, 1 is not prime. contradiction.

4.3. If this number is $n+4$. Either $n+4$ is not prime, contradiction, or $n+4 = 3 \Rightarrow n = -1$, -1 is not prime. contradiction.

5.That means under any circumstance, one of $n, n+2, n+4$ will always not be prime number.

6. By contradiction there is not another prime triple other than 3,5,7.

conclusion: we proved that the only prime triple is 3,5,7 by contradiction.