1. Produce a clear and clean proof of the following statement you have discovered in class: Let a and b two positive integers. Then $ab = \gcd(a,b)\operatorname{lcm}(a,b)$.

2. We learned that if two integers a and b are relatively prime, then there exist integers t and u such that $at + bu = 1$. Prove the converse: if there are integers t and u such that $at + bu = 1$ then a and b are relatively prime.

3. Let a and b be integers with $b > 0$. Using division algorithm, write $a = bq + r$ where $q, r \in \mathbb{Z}$ and $0 \leq r < b$. Show that $\gcd(a,b) = \gcd(b,r)$.

4. Show that for all positive integers $n > 2$, $\phi(n)$ is an even number.

5. Prove that if d divides n then $\phi(d)$ divides $\phi(n)$.