(1) Using the Euclidean Algorithm prove that if $gcd(a,b) = 1$ and $a|c, b|c$ then $ab|c$.
(2) Using the Euclidean Algorithm find $gcd(291,573)$ and integer x, y such that $291x + 573y = gcd(291,573)$.
(3) Find $10^{5^{101}} (\mod 21)$.
(4) Let p_1, p_2, p_3 be distinct prime numbers.
Using the method from class give a careful proof of the formula

$$\phi(p_1^{k_1} p_2^{k_2} p_3^{k_3}) = (p_1^{k_1} - p_1^{k_1-1})(p_2^{k_2} - p_2^{k_2-1})(p_3^{k_3} - p_3^{k_3-1})$$