Number Theory Homework Week 7

1. Solve $25x≡15(30)$.
2. Let $a=4$, $p=19$. Show that $a,2a,3a,…\left(p-1\right)a$ match up with $1,2,3,…,18$ modulo $p$. (paying our respects to the proof of Fermat’s Little Theorem)
3. Put 2, 3, … , 21 into pairs so that $ab≡1\left(23\right).$ (paying our respects to the proof of Wilson’s Theorem)
4. Show $18!≡-1\left(437\right).$
5. Find $τ(30)$ and $σ\left(30\right).$ Do each 2 ways, i.e., calculate directly and also use $τ\left(n\right)=\sum\_{d|n}^{}1$ and $σ\left(n\right)=\sum\_{d|n}^{}d$.
6. Find $τ(33300)$ and $σ\left(33300\right)$.

5 points each