二 (a) Find the first three $n \geq 1$ such that $6n+1$, $12n+1$ and $18n+1$ are all prime

(b) if $6n+1$, $12n+1$ and $18n+1$ are prime for a $n \geq 1$

prove $N=(6n+1)(12n+1)(18n+1)$ is a carmichel number ($a^{N-1} \equiv 1 \pmod N$) for all a that are relatively prime to N)

三 (a) let $n>1$ be an odd integer. let x, y, z be integers such that $\gcd(x,y)=1$ $xy=z^n$

prove there exist intergers a, b such that $x=a^n$, $y=b^n$

(b) prove the only integral solution to $y^2-y=x^3$ are $(0,0)$, $(0,1)$

四 let $a>1$ $b>1$ be two relatively prime integers

(a) prove no exist no negative integers x, y $xa+yb=ab-a-b$

(b) proof for any $N>ab-a-b$ there are not nagative integer x, y $xa+yb=N$

五 p be an odd prime

$$\sum_{a=1}^{p-1}\left(\frac{a(a+1)}{p}\right) \qquad \sum_{a=0}^{p-1}\left(\frac{a^2+1}{p}\right)$$

$\left(\frac{\cdot}{p}\right)$ is the legendre symbol