1. Show that $[6]$ is a zero divisor in $\mathbb{Z}/18\mathbb{Z}$.

$(6,18) = 6$ and $1 \leq 6 < 18$ so $[6]$ is classified as a zero divisor by the Theorem in class. Another solution could be simply writing down the equation $[6][3] = [18] = [0]$.

2. Find all zero divisors in $\mathbb{Z}/18\mathbb{Z}$ which are complementary to $[6]$.

$[6]x = [0]$ gives $6x + 18y = 0$, so $x = 0 + \frac{18}{3}k = 6k$. This gives the list of all solutions as $[0], [6], [12], [18] = [0]$. Stop!

Out of these $[6]$ and $[12]$ are the complementary zero divisors.

3. Prove that a unit cannot be a zero divisor, in any ring.

Suppose $a$ is a unit with the inverse $a^{-1}$, and suppose it is a zero divisor. Then there is $b \neq 0$ such that $ab = 0$. Multiply both sides by $a^{-1}$: $a^{-1}(ab) = a^{-1} \cdot 0$ so $(a^{-1}a)b = 0 \Rightarrow 1 \cdot b = 0 \Rightarrow b = 0$. This contradicts $b \neq 0$. So a unit cannot be a zero divisor.