Sets and set operations (exercises)

Mr. Neeman. 10B, November 22, 2011.

#1. Suppose the following:

$\Omega = \{x \in \mathbb{Z} | 2 < x < 10\}$
$A = \{x \in \Omega | x \text{ is even}\}$
$B = \{x \in \Omega | x \geq 5\}$
$C = \{x \in \Omega | x \text{ is divisible by } 4\}$

(a) List the elements of A.
(b) List the elements of B.
(c) List the elements of C.
(d) List the elements of A'.
(e) List the elements of C'.
(f) Is A' a subset of C'?
(g) Is A' a proper subset of C'?
(h) Is B a subset of A?
(i) List the elements of $(A \cup B)'$
(j) List the elements of $A \cap C$.
(k) Is $A \cap C$ a subset of C?
(l) Is $A \cap C$ a proper subset of C?
(m) List the elements of B'.
(n) List the elements of $B' \cup C$.
(o) List the elements of $C' \cap C$.

#2. For each of the following, say whether it's true or false. Give an example to support your answer, where appropriate (e.g. if you say it's false that $\mathbb{R} \subset \mathbb{Q}$, an example of why would be a real number which isn't rational, such as π; if you say it's true that $\mathbb{N}$ is a proper subset of $\mathbb{R}$, you can give an example of a real number which isn't a natural number (e.g. π), to show the two sets aren't equal).

(a) $\pi \in \mathbb{Z}$
(b) $0 \in \mathbb{Q}$
(c) $-7 \in \mathbb{N}$
(d) $\mathbb{N} \subset \mathbb{Q}$
(e) $\mathbb{Q} \cup \mathbb{Z} = \mathbb{Q}$.
(f) $\sqrt{9} \in \mathbb{Q}$
(g) $\frac{\sqrt{3}}{5} \in \mathbb{Q}$