

You must show your work to get full credit.

1. Let

$$A = \{15x + 10y : x, y \in \mathbb{Z}\}$$

$$B = \{n \in \mathbb{Z} : 5 \mid n\}.$$

Prove $A = B$.

We show both $A \subseteq B$ and $B \subseteq A$.

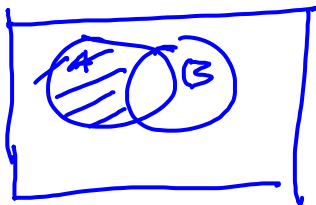
$A \subseteq B$. Let $a \in A$. Then $a = 15x + 10y = 5(3x + 2y)$,
for some $x, y \in \mathbb{Z}$. But $q = 3x + 2y \in \mathbb{Z}$ so
 $a = 5q$. Thus $5 \mid a$. Therefore $a \in B$. This
shows $A \subseteq B$.

$B \subseteq A$. Let $n \in B$. Then $5 \mid n$ so $n = 5q$ for
some $q \in \mathbb{Z}$. Then
 $n = 5q = 15q - 10q$
 $= 15x + 10y$
where $x = q, y = -q$. Thus $n \in A$.
This shows $B \subseteq A$.

Since $A \subseteq B$ and $B \subseteq A$. This implies $A = B$.

2. Draw the Venn diagrams for

(a) $A \cap B^c$



(b) $(A \cap B) \cup (A \cap C) \cup (B \cap C)$.

