1. Beweisen Sie durch das Anweden der Gesetze der Mengenalgebra:

   (a) $A \cap (A \cup B) = A$

   Lösung:

   Es gilt:

   $$\begin{aligned} & A \cap (A \cup B) && = A \\ \equiv\ & (A \cap A) \cup (A \cap B) && = A \\ \equiv\ & A \cup (\underbrace{A \cap B}_{\subseteq A}) && = A \\ \equiv\ & A = A \end{aligned}$$

   $\square$

   (b) $(A \cap B) \cup (A \cap \bar{B}) = A$

   Lösung:

   Es gilt:

   $$\begin{aligned} & (A \cap B) \cup (A \cap \bar{B}) = A \\ \equiv\ & A \cap (B \cup \bar{B}) = A \\ \equiv\ & A \cap \Omega = A \\ \equiv\ & A = A \end{aligned}$$

   $\square$

   (c) $\bar{A} \cup (A \cap \emptyset) = A$

   Lösung:

   Es gilt:

   $$\begin{aligned} & \bar{A} \cup (A \cap \emptyset) = A \\ \equiv\ & (\bar{A} \cup A) \cap (\bar{A} \cup \emptyset) = A \\ \equiv\ & (\bar{A} \cup A) \cap \bar{A} = A \\ \equiv\ & \bar{A} = A \quad \lightning \end{aligned}$$