Problem 1.

Use the Euclidean algorithm to find $d = \gcd(35, 98)$ and to express $d$ as a linear combination of 35 and 98. Provide all details of your work.

Solution.

Put $a = 98$, $b = 35$ and perform the Euclidean algorithm:

\begin{align*}
98 &= 2 \cdot 35 + 28 \\
35 &= 1 \cdot 28 + 7 \\
28 &= 4 \cdot 7 + 0
\end{align*}

Hence $7 = \gcd(98, 35)$.

Performing back substitutions in the above formulas we obtain:

$7 = 35 - 1 \cdot 28 = 35 - 1 \cdot (98 - 2 \cdot 35) = 3 \cdot 35 - 1 \cdot 98$. 