1. Given \( \vec{u} = (1, 2), \vec{v} = (-2, -1) \), draw vectors \( \vec{u}, \vec{v}, \) and \( \vec{u} + \vec{v} \).

Solution:

\[
\begin{align*}
\vec{u} &= (1, 2) \\
\vec{v} &= (-2, -1) \\
\vec{u} + \vec{v} &= (1, 2) + (-2, -1) = (-1, 1)
\end{align*}
\]

2. Suppose \( \vec{u} = (1, 1) \), \( \vec{v} \) is in the same direction as \( \vec{u} \), and \( |\vec{v}| = |\vec{u}|^2 \). Find \( \vec{v} \)

Solution:

\[
|\vec{u}| = \sqrt{1^2 + 1^2} = \sqrt{2}
\]

\( \vec{v} \) is in the same direction as \( \vec{u} \), so there is a real number \( c > 0 \) such that

\[
\vec{v} = c\vec{u}
\]

Because \( c > 0 \), we have

\[
|\vec{v}| = c|\vec{u}| = \sqrt{2}c,
\]

but we are given

\[
|\vec{v}| = |\vec{u}|^2 = 2
\]

So \( \sqrt{2}c = 2 \), this means \( c = \sqrt{2} \). So

\[
\vec{v} = \sqrt{2}\vec{u} = (\sqrt{2}, \sqrt{2})
\]