Problem 1 (5 points). Let \( f(x) = \sqrt{x-4} + 1 \).

(a) Determine a formula for \( f^{-1}(x) \).

\[
\begin{align*}
\text{Let } & y = f(x) = \sqrt{x-4} + 1 \\
\text{Then } & y = \sqrt{x-4} + 1 \\
\text{Solve for } & x: \\
& y - 1 = \sqrt{x-4} \\
& (y-1)^2 = x-4 \\
& (y-1)^2 + 4 = x
\end{align*}
\]

\( \therefore f^{-1}(y) = (y-1)^2 + 4 \)

(b) What is the range of \( f(x) \)?

\( f(x) = \sqrt{x-4} + 1 \) is like \( \sqrt{x} \), but shifted right and up. The radical \( \sqrt{x-4} \) only outputs numbers \( \geq 0 \), and then I add 1 to the radical, so \( \sqrt{x-4} + 1 \) is always \( \geq 1 \). Therefore, range is \( \boxed{y \geq 1} \).

(c) What is the domain of \( f^{-1}(x) \)?

Domain of \( f^{-1}(x) \) is \( \boxed{y \geq 1} \)

(since the domain of \( f^{-1}(x) \) is the same as the range of \( f(x) \))
Problem 2 (5 points).  (a) Sketch the line \( p(d) = \frac{1}{4}d - 2 \).

(b) Let \( q(d) = \frac{1}{2}d + 3 \). Where do the lines \( p(d) \) and \( q(d) \) intersect? Write your answer as a coordinate pair.

Set  \( p(d) = q(d) \)

So  \( \frac{1}{4}d - 2 = \frac{1}{2}d + 3 \)

Solve for \( d \):

\[
\frac{1}{4}d = \frac{1}{2}d + 5
\]

\[
\frac{1}{4}d - \frac{1}{2}d = 5
\]

\[
-\frac{1}{4}d = 5
\]

\[
d = -20
\]

Plug in \( d \): \( p(20) = \frac{1}{2} \cdot (-20) + 3 = -10 + 3 = -7 \)

So, intersects at \( (-20, -7) \)