1. \( f^{-1}(6) = 2 \) \( f^{-1}(f(3)) = 3 \) \( f(f^{-1}(7)) = 7 \)

2. \( f^{-1}(-1) = 0 \) \( f^{-1}(f(0)) = 0 \) \( f(f^{-1}(2)) = 2 \)

3. \( g(x) \) has no inverse because it is not a one-to-one function. (output of 5 has 2 possible inputs)

4. \( f(x) = x^3 + x^2 \) has no inverse for some reason. \( f(-1) = f(0) = 0 \) (there are 2 \( x \)-intercepts, line test)

5. \( b) h(x) = 4x - 3 \quad (b) L(x) = \frac{1}{2}x - 4 \)
   \[
   x = 4h(x) - 3 \\
   x + 3 = 4h(x) \\
   \frac{x + 3}{4} = h(x) \\
   h'(x) = \frac{x + 3}{4} \\
   L'(x) = 2x + 8
   \]

7. inverse \quad 8) \text{no inverse} \quad 9) \text{no inverse} \quad 10) \text{inverse} \quad 11) f(x) = 3x - 5 \quad 12) f(x) = |x| - 2 \quad \text{[no inverse]}
   \[
   x = 3f(x) - 5 \\
   x + 5 = 3y \\
   \frac{x + 5}{3} = y \\
   f'(x) = \frac{x + 5}{3} \\
   f'(x) = \sqrt[4]{x}, \quad D: x \geq 0 \quad R: f(x) \geq 0
   \]

14. \( f(x) = \frac{1}{x} \)
   \[
   x = \frac{1}{y} \\
   xy = 1 \\
   y = \frac{1}{x} \\
   f^{-1}(x) = \frac{1}{x}, \quad x \neq 0 \\
   \text{(} f(x) \text{ is its own inverse)}
   \]

17. \( f(x) = \sqrt[4]{4 - x^2} \quad \text{[no inverse]} \quad 18) f(x) = \sqrt{5 - x^2} \quad \text{[no inverse]}
   \[
   x = \frac{3}{\sqrt[3]{y + x^3}} \\
   x^3 = 1 + y^3 \\
   x^3 - 1 = y^3 \\
   f^{-1}(x) = \frac{3}{\sqrt[3]{x^3 - 1}}
   \]
20) \[ g(x) = x^2 + 2, \quad x \geq 0 \]

\[ x = y^2 + 2 \]
\[ x - 2 = y^2 \]
\[ \pm \sqrt{x - 2} = y \]
\[ g^{-1}(x) = \sqrt{x - 2}, \quad x \geq 2 \]

\( g(x) \) Domain of \( x \geq 0 \) means range of \( g^{-1}(x) \) must be \( y \geq 0 \) (upper branch)

21) \[ g(x) = 9 - x^2, \quad x \leq 0 \]

\[ x = 9 - y^2 \]
\[ y^2 = 9 - x \]
\[ y = \pm \sqrt{9 - x} \]
\[ g^{-1}(x) = -\sqrt{9 - x}, \quad x \leq 9 \]

\( g(x) \) Domain of \( x \leq 0 \) means range of \( g^{-1}(x) \) must be \( y \leq 0 \) (lower branch)

22) \[ g(x) = (x-1)^2 + 1, \quad x \leq 1 \]

\[ x = (y-1)^2 + 1 \]
\[ x - 1 = (y-1)^2 \]
\[ \pm \sqrt{x - 1} = y - 1 \]
\[ 1 \pm \sqrt{x - 1} = y \]
\[ g^{-1}(x) = 1 - \sqrt{x - 1}, \quad x \geq 1 \]

\( g(x) \) Domain of \( x \leq 1 \) means range of \( g^{-1}(x) \) must be \( y \leq 1 \) (lower branch)

Range of \( g(x) \) \( x \geq 1 \) becomes domain \( x \geq 1 \) of \( g^{-1}(x) \)
23) \( g(x) = (x-4)^2 - 1, \quad x \geq 4 \)
\[
X = (y-4)^2 - 1
\]
\[
x + 1 = (y-4)^2
\]
\[
\pm \sqrt{x+1} = y - 4
\]
\[
4 \pm \sqrt{x+1} = y
\]
\[
g^{-1}(x) = 4 + \sqrt{x+1}, \quad x \geq -1
\]
\[
\text{Domain of } x \geq 4 \text{ means range of } g^{-1}(x) \text{ is } y \geq 4 \text{ (upper branch)}
\]
\[
\text{Range of } g(x): \ y \geq -1 \text{ becomes domain of } g^{-1}(x): \ x \geq -1
\]

24) \( h(x) = \sqrt[3]{1-x^3} \)
\[
X = \sqrt[3]{1-y^3}
\]
\[
x^3 = 1 - y^3
\]
\[
y^3 = 1 - x^3
\]
\[
y = \sqrt[3]{1-x^3}
\]
\[
h^{-1}(x) = \sqrt[3]{1-x^3} = h(x)
\]
\[
(\text{h}(x) \text{ is its own inverse})
\]

25) \( h(x) = \frac{x}{x-1} \)
\[
x = \frac{y}{y-1}
\]
\[
xy - y = x
\]
\[
x(y-1) = y
\]
\[
h^{-1}(x) = \frac{x}{x-1}, \quad x \neq 1
\]

Since domain of the original fn \( h(x) \) was \((-\infty, 1) \cup (1, \infty)\), you would not have to state \( x \neq 1 \) unless requested for \( h^{-1}(x) \)