1. (*a*) $\boxed{1}$ (*b*) $\boxed{1}$ (*c*) $\boxed{2}$ (*d*) $\boxed{\text{DNE}}$ (*e*) $\boxed{0}$

2. (*a*) $x^2 - 4 \neq 0$ implies $(x-2)(x+2) \neq 0$. Therefore $\boxed{x \neq -2, 2}$.

(*b*) We need $x \geq 0$ so that $\sqrt{x}$ makes sense; we also need $1 - \sqrt{x} \geq 0$ so that $\sqrt{1-\sqrt{x}}$ makes sense. The second condition gives $\sqrt{x} \leq 1$, that is $x \leq 1$. So we conclude $\boxed{0 \leq x \leq 1}$.

3. $f \circ g(x) = \boxed{4x^2 + 4x}$

$g \circ f(x) = \boxed{2x^2 - 1}$

4. (*a*) The function is polynomial, so by direct substitution property we can substitute x by 1 in the expression to get

$$\lim_{x \to 1} \left[2(x+1)^2 - x^4(x+3)\right] = \boxed{4}$$

(*b*) By quotient law and root law, we can substitute x by 1 in the expression to get

$$\lim_{x \to -1} \frac{\sqrt[3]{x-7}}{\sqrt{x^2+1}} = \frac{\sqrt[3]{-8}}{\sqrt{2}} = \boxed{-\sqrt{2}}$$