Homeworks for 2^{nd} week

Find the ranges of following functions. Are they injective (give reason)? If so, find the formula of f^{-1}.

1. $f(x) = \sqrt{1 - \log(\frac{x+2}{4})}$
2. $f(x) = \arcsin\sqrt{1 - 4x^2}$
3. $f(x) = \frac{\pi}{2} + \operatorname{arctg}\sqrt{x - 1}$
4. $f(x) = \log_{\frac{1}{2}} \sqrt{9x^2 - 4}$
5. $f(x) = 1 - \sqrt{\log_5(6 - x)}$
6. $f(x) = \operatorname{arctg}\frac{1}{(x-3)^6}$
7. $f(x) = \sqrt{4 - \sqrt{4 - x}}$
8. $f(x) = \operatorname{arctg}\sqrt{x^2 - x}$
9. $f(x) = (\log(\sqrt{x}))^3$.
10. $f(x) = \sqrt{\frac{\pi}{6} - \operatorname{arccotg}\sqrt{x}}$
11. Sketch the graphs of following functions
    (a) $f(x) = -\cos(x - \frac{\pi}{6}) + 1$
    (b) $f(x) = \sin(\frac{\pi}{4} - x)$
12. Consider two increasing functions f and g. Prove that a composition $h = f \circ g$ is an increasing function. If f is increasing and g is decreasing are $f \circ g$ and $g \circ f$ increasing or decreasing?