GROUP 1. Find the domain of the function $y = f(x)$. Is $f$ invertible? If so, find the inverse function $x = f^{-1}(y)$ and its domain of definition.

(a) $f(x) = \frac{1}{|x-a|}$
(b) $f(x) = 2 + e^{\sqrt{x}}$
(c) $f(x) = \cos^{-1}(x) + a$

GROUP 2. Solve

(a) $\tan^2 3\theta = 3$ in the interval $-\frac{\pi}{2} < \theta < \frac{\pi}{2}$.
(b) $\sin^2 \theta + \cos \theta = \frac{5}{4}$ in the interval $-\pi < \theta < \pi$.

GROUP 3. Simplify (your answer should be a polynomial/rational function)

(a) $\sin^2(\arccos(x))$
(b) $\cos(2 \arcsin(2x))$.

GROUP 4. For which $a$, $b$ is the function continuous:

$$f(x) = \begin{cases} (a + \cos \frac{\pi x}{2})^2 & x \geq 1 \\ 2 - a|x| & -1 < x < 1 \\ b|x|^2 & x \leq -1 \end{cases}$$