1. Fin the domain of the following function.

$$f(x) = \sqrt{\frac{x-1}{x^2+3x+2}} \tag{1}$$

2. Find the value of

$$\cos(2\arcsin(x)) \tag{2}$$

as a function of x.
hint: Recall that $\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta)$. Substitute $\arcsin(\alpha)$ with θ and use the given relation.

3. Find the limit.

$$\lim_{x\to 3} \frac{\sqrt{x^2-3}-\sqrt{6}}{x^2-2x-3} \tag{3}$$

hint: Rationalize the numerator!