Continuity and Limits of Composite Functions

1. Determine if

$$f(x) = \begin{cases} \frac{x^2-1}{x-1} & x \neq 1 \\ 3 & x = 1 \end{cases}$$

is continuous at $a = 1$.

Ans. No.

2. Determine the interval(s) on which the function

$$g(x) = \frac{3x^2 - 6x + 7}{x^2 + x + 1},$$

is continuous.

Ans. $(-\infty, \infty)$.

3. Evaluate

$$\lim_{x \to 4} \sqrt{\frac{x^3 - 2x^2 - 8x}{x - 4}}$$

Ans. $2\sqrt{6}$.