Calculus Exercises (1.5)

1. \( f(x) = \begin{cases} \frac{3-x}{9-x^2} & \text{if } x \neq 3 \\ 2 & \text{if } x = 3 \end{cases} \)

   (1) Find \( \lim_{{x \to 3}} f(x) \) if it exists, if not, explain why.

   (2) Is \( f(x) \) continuous at \( x = 3 \)? State the reason. If \( x = 3 \) is a discontinuity of \( f \), determine whether it is removable or nonremovable. Why?

2. Where is the function continuous?

   (a) \( f(x) = \frac{x-7}{|x-7|} \)

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

3. Find an interval of length 1 that contains a root of the equation \( x^5 - x^2 + 2x + 3 = 0 \). (長度為1的區間)