Name: **A#:**

1. The function g is defined by

$$g(x) = \begin{cases} \dfrac{x^2 + x - 2}{|x - 1|} & \text{if } x \neq 1 \\ 2 & \text{if } x = 1. \end{cases}$$

Determine whether g is continuous at $x = 1$, and sketch the graph of $y = g(x)$

2. Consider the function

$$f(x) = \begin{cases} x + 1 & \text{if } x \leq 0 \\ x^2 - x & \text{if } 0 < x < 2 \\ \sqrt{x + 2} & \text{if } x \geq 2 \end{cases}$$

Determine all numbers at which f is discontinuous. At which of these numbers is the function continuous from the right, from the left, or neither? Sketch the graph of f.

3. Find all critical values of the function $f(x) = (2x - x^2)^{2/3}$.

4. Find the absolute maximum and minimum values of the function $h(x) = \dfrac{4x + 3}{x^2 + 1}$ over the interval $[-3, 3]$.