2 Piecewise Functions

1. If
$$f(x) = \begin{cases} x^2 + dx & x \leq 1 \\ 3x - 1 & x > 1 \end{cases}$$
Find the value of d if $f(x)$ is continuous at $x = 1$.

2. If
$$f(x) = \begin{cases} x^3 - mx & x \leq -1 \\ 2x + 2 & x > -1 \end{cases}$$
Find the value of m if $f(x)$ is continuous at $x = -1$.

3. If
$$f(x) = \begin{cases} -x^2 - px & x \leq 1 \\ -5x - 3 & x > 1 \end{cases}$$
Find the value of p if $f(x)$ is continuous at $x = 0$.

4. If
$$f(x) = \begin{cases} 2x^2 & x < 1 \\ -x^2 + mx + n & x \geq 1 \end{cases}$$
Find the value of m and n if $f(x)$ is continuous and differentiable at $x = 1$.

5. If
$$h(x) = \begin{cases} \dfrac{x^2 - 9}{x - 3} & x < 2 \\ ax^2 - bx + 4 & 2 \leq x < 3 \\ 3x - a + b & x \geq 3 \end{cases}$$
Find the values of a and b that make the function continuous everywhere.