Find and classify the discontinuities of the following functions.

a) $g(x) = \dfrac{x^2 - 81}{x - 9}$, Consider $x = 9$.

$$\lim_{x \to 9} \frac{x^2 - 81}{x - 9} = \lim_{x \to 9} \frac{(x+9)(x-9)}{(x-9)} =$$

$$\lim_{x \to 9} (x+9) = 18 . \quad \text{Define } g(9) = 18.$$

b) $w(x) = \begin{cases} x + 2 & \text{if } x \leq 0 \\ -x^2 + 2 & \text{if } x > 0 \end{cases}$ What if $x = 0$?

$$\lim_{x \to 0^-} w(x) = \lim_{x \to 0^-} (x+2) = 2 .$$

$$\lim_{x \to 0^+} w(x) = \lim_{x \to 0^+} (-x^2+2) = 2$$

$$\lim_{x \to 0} w(x) = 2 = w(0).$$

So w is a continuos fn.