

8) Find a and b such that the following function is continuous at $x = 0$

$$f(x) = \begin{cases} \frac{\sin ax}{\sin 3x} & x < 0 \\ 1 & x = 0 \\ \frac{\sqrt{b+x} - \sqrt{b-x}}{x} & x > 0. \end{cases}$$

$$\lim_{x \rightarrow 0^-} \frac{\sin ax}{\sin 3x} = 1$$

$$\lim_{x \rightarrow 0^+} \frac{\sqrt{b+x} - \sqrt{b-x}}{x} = 1$$

$$x \rightarrow 0^+$$

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

$$2 = \sqrt{b+x} + \sqrt{b-x}$$

$$\text{at } x = 0 \quad b = 1$$

$$\frac{\sin ax}{\sin 3x} \Rightarrow | a =$$
$$x \rightarrow 0^-$$