1) $f(x) = \begin{cases} \dfrac{x^2-4x+3}{x^2-3x+2} & , x<1 \\ \sqrt{x+3} & , 1 \le x \le 6 \\ \dfrac{\sin(2x-12)}{x-6} & , x>6 \end{cases}$

a) $x=1 \Rightarrow \lim\limits_{x \to 1-0} \dfrac{x^2-4x+3}{x^2-3x+2} = \text{"}\dfrac{0}{0}\text{"}$

$\Rightarrow \lim\limits_{x \to 1-0} \dfrac{(x-3)\cancel{(x-1)}}{(x-2)\cancel{(x-1)}} = \lim\limits_{x \to 1-0} \dfrac{(x-3)}{(x-2)} = \dfrac{-2}{-1} = 2$

$\lim\limits_{x \to 1+0} \sqrt{x+3} = \sqrt{1+3} = 2$

So $\lim\limits_{x \to 1-0} = \lim\limits_{x \to 1+0} = 2$ $\quad f \in C\{1\}$

b) $x=6 \Rightarrow \lim\limits_{x \to 6-0} \sqrt{x+3} = \sqrt{9} = 3$

$\lim\limits_{x \to 6+0} \dfrac{\sin(2x-12)}{x-6} = \dfrac{\sin 0}{0} = \text{"}\dfrac{0}{0}\text{"}$. We know that $\lim\limits_{x \to 0} \dfrac{\sin x}{x} = \dfrac{x}{x} = 1$

So $\lim\limits_{x \to 6+0} \dfrac{\sin(2x-12)}{x-6} = \dfrac{2x-12}{x-6} = 2$

So $\lim\limits_{x \to 6+0} \neq \lim\limits_{x \to 6-0} \Rightarrow f \notin C\{6\}$ (jump)