Answer on Question #69775 – Math – Calculus

Find the value of 'a' for which the function f defined by f(x)={(2-√(4-x))/x , x<0 ; a , x=0 ; (1-cosx)/2tan^(2)x, x>0 is continuous everywhere

Solution. We should find the left and the right limits of the given function at the point x=0, if they are the same we can make this function continuous:

$$f(x)=\begin{cases}\dfrac{2-\sqrt{4-x}}{x}, & x<0;\\ a, & x=0;\\ \dfrac{1-\cos x}{2\tan^2 x}, & x>0.\end{cases}$$

So we have

$$f(x\to 0_-)=\frac{2-\left(2-\frac{x}{4}+O(x^2)\right)}{x}=\frac{1}{4},$$

$$f(x\to 0_+)=\frac{1-\left(1-\frac{x^2}{2}+O(x^4)\right)}{2\left(x^2+O(x^4)\right)}=\frac{1}{4}.$$

Answer: $a=\frac{1}{4}$.

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