

Answer on Question #84858 – Math – Calculus

Question

The domain of the function f , given by $f(x) = \sqrt{(2-x)/x}$ is $[0,1]$. Is it true or false?

Solution

$$f(x) = \sqrt{\frac{2-x}{x}}$$

This is a radical function. The domain of a radical function is any x value for which the radicand is not negative. That means

$$\frac{2-x}{x} \geq 0$$

The critical values of this inequality are 2 and 0 because the numerator is equal to zero when $x = 2$ and the denominator is equal to zero when $x = 0$

The critical values and separate the real number line into the three intervals $(-\infty, 0)$, $(0,2]$, $[2, \infty)$

Determine the signs of radicand on each interval

$$\begin{aligned} \frac{2-(-1)}{-1} &= -3 < 0 \\ \frac{2-1}{1} &= 1 > 0 \\ \frac{2-3}{3} &= -\frac{1}{3} < 0 \end{aligned}$$

All values of x on the interval $(0,2]$ make $\frac{2-x}{x}$ positive, as desired. On the other intervals, the quotient is negative.

The solutions for this inequality is $(0,2]$
Thus the domain of the function f is $(0,2]$

Answer:

Statement 'The domain of the function f , given by , $f(x) = \sqrt{(2-x)/x}$ is $[0,1]$ ' is false.

The correct answer is $(0,2]$.

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