

Quiz # 3: SOLUTIONS

1. (a) The equation is wrong because the domain of the function on the left hand side of the equation is $x \neq 2$ but the domain of the function on the right side of the equation is all real numbers. These two functions are different, even though for many purposes they are the same. (For instance, one can use either function when computing limits; next.)

(b) For values of x not equal to 2 the equation in part (a) is correct. Therefore the limits are equal, because the limit as x approaches 2 is not affected by the value of a function at $x = 2$.

2.

$$\lim_{t \rightarrow 0} \frac{1}{t} - \frac{1}{t(t+1)} = \lim_{t \rightarrow 0} \frac{t+1-1}{t(t+1)} = \lim_{t \rightarrow 0} \frac{t}{t(t+1)} = \lim_{t \rightarrow 0} \frac{1}{t+1} = 1$$

3. The graph shows that if x is between 6.76 and 11.56 then \sqrt{x} is within 0.4 of 3. Find δ by using these facts, that is, we choose $\delta = 2.24 = 9 - 6.76$ because if x is within 2.24 of 9 then we will still be in the interval between 6.76 and 11.56.

(A value for δ smaller than 2.24 is O.K., as long as $\delta > 0$.)

4. Set the formulas which define the two parts of $g(x)$ equal to each other at the point $x = 1$:

$$\begin{aligned} s(1) + 2 &= \frac{1}{1} \\ s &= 1 - 2 \\ s &= -1. \end{aligned}$$

5. The function $f(x) = \frac{1}{\sin(2x)}$ is discontinuous when the denominator equals zero. So

$$\sin(2x) = 0$$

or

$$2x = n\pi$$

or

$$x = \frac{n\pi}{2}$$

where n is any integer.