

MAT 21A Homework 3: Additional problems to be turned in

These problems are due in discussion section on Tuesday, October 6.
Be sure to show all your work!

1. Do exercise 8 from section 2.3 of the textbook.
2. Do exercise 10 from section 2.3 of the textbook.
3. Consider the function $f(x) = 1/x$.
 - (a) Sketch a graph of $f(x)$. Note that there is a graph of the function on page 11 of the textbook.
 - (b) Clearly mark on the graph an interval on the y -axis such that if y is inside the interval, the difference between y and 2 is less than 0.1. Label the endpoints of this interval. You should make sure that your graph is big enough that this interval is clear (graph does not have to be to scale).
 - (c) Sketch the graph again; this time clearly mark the same interval on the y -axis and an interval on the x -axis such that if x is inside the interval, the difference between $f(x)$ and 2 is less than 0.1. Label the endpoints of this interval. Again, be sure the graph is big enough that the interval is clear.
4. Consider the functions $f(x) = x^2$ and $g(x) = \sqrt{x}$.

In order to show that the limit of $f(x)$ as $x \rightarrow 0$ is equal to 0, you would need to find a formula for δ in terms of ε such that if $|x - 0| < \delta$ then $|f(x) - f(0)| < \varepsilon$.

Similarly, to show that the limit of $g(x)$ as $x \rightarrow 0$ from the right is equal to 0, you would need to find a formula for δ in terms of ε such that if $|x - 0| < \delta$ then $|g(x) - g(0)| < \varepsilon$.

Match the following choices of δ with the functions so that the choice of δ establishes the limit. Use each choice only once.

I. $f(x) = x^2$

II. $g(x) = \sqrt{x}$

A. $\delta = \varepsilon^2$

B. $\delta = \sqrt{\varepsilon}$