

WORKSHEET: LIMITS 1

Names and student IDs: _____

1. You want to find $\lim_{x \rightarrow 1} \frac{x^2 - 3x + 2}{x - 2}$. Set $f(x) = \frac{x^2 - 3x + 2}{x - 2}$ for $x \neq 2$.

Step 1: Does anything go wrong if you try to substitute $x = 1$?

Step 2: Your answer above should have been “no”. So what do you think the limit should be?

2. You want to find $\lim_{x \rightarrow 2} \frac{x^2 - 3x + 2}{x - 2}$.

Step 1: Does anything go wrong if you try to substitute $x = 2$?

Step 2: Your answer above should have been “yes”. So what do you do? Hint: Factor the numerator.

3. You want to find $\lim_{x \rightarrow 2} \frac{x^2 - 3x + 2}{x^2 - 4}$.

Step 1: Does anything go wrong if you try to substitute $x = 2$?

Step 2: Your answer above should have been “yes”. So what is the first algebraic step you do?

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Date: 7 January 2024.

4. You want to find $\lim_{x \rightarrow 3} \frac{\sqrt{x} - \sqrt{3}}{x - 3}$.

Does anything go wrong if you try to substitute $x = 3$?

Your answer above should have been “yes”. It isn’t obvious how to factor, so let’s try to estimate the limit numerically. Use a calculator to approximate the following:

$$\begin{array}{ll} f(2) \approx \underline{\hspace{2cm}} & f(4) \approx \underline{\hspace{2cm}} \\ f(2.9) \approx \underline{\hspace{2cm}} & f(3.1) \approx \underline{\hspace{2cm}} \\ f(2.99) \approx \underline{\hspace{2cm}} & f(3.01) \approx \underline{\hspace{2cm}} \end{array}$$

What is your guess for the limit?

Let’s try to find the exact value. Rationalize the numerator: multiply the numerator and denominator by $\sqrt{x} - \sqrt{3}$. Multiply out in the numerator but **not** in the denominator.

Suppose you **do** multiply out in the denominator. What do you get, and what do you do next?