

Name: _____

Give an answer. Show all work. No calculators are allowed.

1. Let $f(x) = x^3 + x + 4$. Compute and simplify

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

(meaning: you're done when you have a single polynomial, not a rational function)

If we divide the denominator into the numerator using polynomial long division we find

$$\frac{f(x) - f(2)}{x - 2} = \frac{x^3 + x - 10}{x - 2} = x^2 + 2x + 5$$

2. Using the first problem (and the results on polynomials and constants we already know), compute

$$\lim_{x \rightarrow 2} \frac{f(x) - f(2)}{x - 2}$$

where f is as above.

We can use our limit rules to just plug in 2 so the limit is $4 + 4 + 5 = 13$.

3. Compute

$$\lim_{x \rightarrow 4} \frac{x - 4}{\sqrt{x} - 2}$$

We can do this in two ways. One of which is to see $x - 4 = (\sqrt{x} - 2)(\sqrt{x} + 2)$. So we can divide the bottom into the top and our limit becomes

$$\lim_{x \rightarrow 4} \sqrt{x} + 2 = 4$$