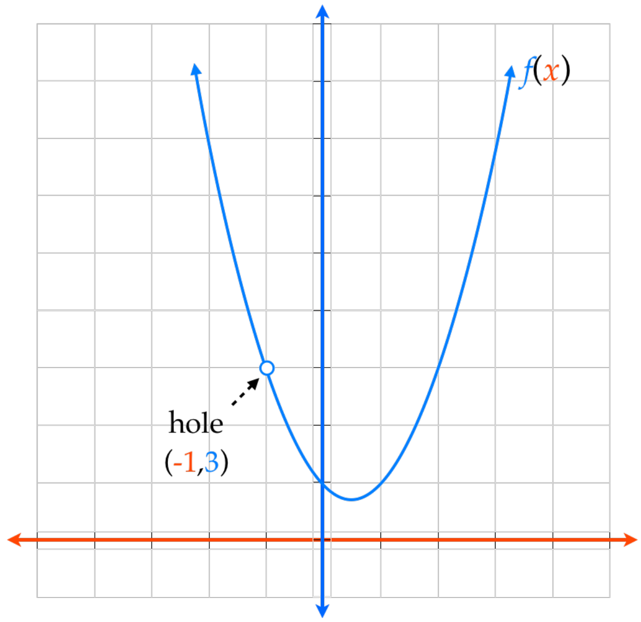
Two Functions that Agree at All But One Point

Name ____________________

Date ____________ Period ______

$$f(x) = \frac{x^3 + 1}{x + 1}$$



$$f(x) = \frac{x^3 + 1}{\boxed{x + 1}} \qquad x + 1 \neq 0$$

$$x \neq -1$$

$$\lim_{x \to -1} f(x)$$

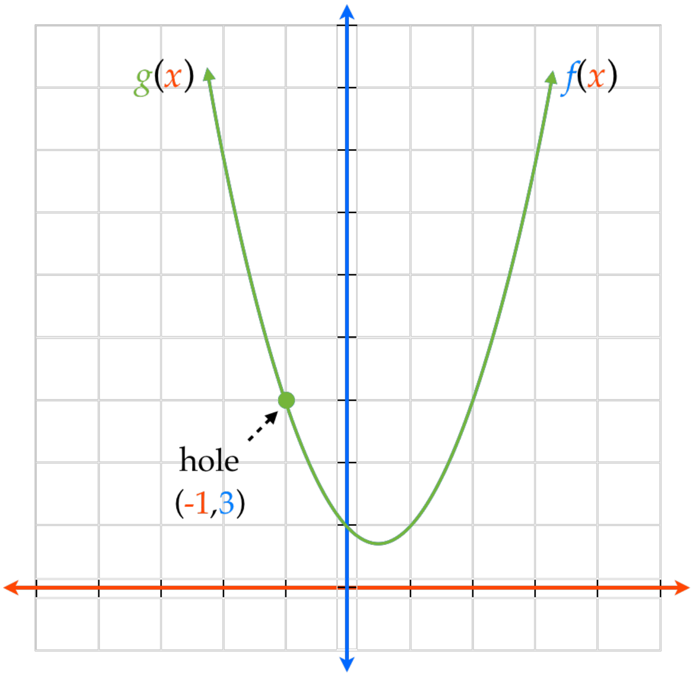
$$\frac{x^3 + 1}{x + 1} = \frac{\cancel{(x + 1)}(x^2 - x + 1)}{\cancel{x + 1}}$$

$$g(x) = x^2 - x + 1$$

$$\lim_{x \to -1} g(x)$$

$f(x)$ and $g(x)$ agree at all points but $x = -1$.

$f(-1)$ is undefined; $g(-1) = 3$



$$\lim_{x \to -1} f(x) = \lim_{x \to -1} \frac{x^3 + 1}{x + 1}$$

$$= \frac{(-1)^3 + 1}{-1 + 1} = \frac{0}{0} \neq 0$$

Indeterminate Form: No Conclusion

$$\lim_{x \to -1} g(x) = \lim_{x \to -1} x^2 - x + 1$$

$$= (-1)^2 - (-1) + 1$$

$$= 1 + 1 + 1$$

$$= 3$$

Let c be a real number and $f(x)$ and $g(x)$ agree at all but one point, specifically $x = c$. If the limit of $g(x)$ as x approaches c exists and the limit of $f(x)$ as x approaches c exists, then…

$$\lim_{x \to c} f(x) = \lim_{x \to c} g(x)$$

Let $f(x) = \dfrac{x^3 - 8}{x - 2}$

$\lim\limits_{x \to 2} f(x)$

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Let $f(x) = \dfrac{2x^2 - 11x + 12}{x - 4}$

$\lim\limits_{x \to 4} f(x)$

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Let $f(x) = \dfrac{x+4}{x^2-16}$

$\lim\limits_{x \to -4} f(x)$

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Let $f(x) = \dfrac{x^2+x-6}{x^2-9}$

$\lim\limits_{x \to -3} f(x)$

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Let c be a real number and $f(x)$ and $g(x)$ agree at all but one point, specifically $x = c$. If the limit of $g(x)$ as x approaches c exists and the limit of $f(x)$ as x approaches c exists, then…

$$\lim_{x \to c} f(x) = \lim_{x \to c} g(x)$$