



Mar 27-7:58 AM

WARM UP
Factor the following expressions. We'll need them today...

$$x^2 + x - 6 = (x+3)(x-2)$$

$$x^2 + 4x = x(x+4)$$

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

$$x^4 - 1 = (x^2+1)(x^2-1) = (x^2+1)(x-1)(x+1)$$

$$\sqrt[3]{x^3+8} = (x+2)(x^2-2x+4)$$

↑ ↑
Square Square

$$x^3 - 27 = (x-3)(x^2+3x+9)$$

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11.2: Finding Limits Algebraically

a. Plug in the value of c (number x is approaching) into the expression.
b. From there, you have 4 scenarios:

① # ∪
② $\frac{0}{\#} = 0 ∪$
③ $\frac{\# \text{ or } 0}{0} = \text{DNE}$
④ ∪ $\frac{0}{\text{more}}$

$$\lim_{x \rightarrow 3} \frac{x^2+1}{x} = \frac{3^2+1}{3} = \frac{10}{3} ∪$$

$$\lim_{x \rightarrow 3} \frac{x^3+27}{x+3} = \frac{(x+3)(x^2-3x+9)}{x+3}$$

$$\lim_{x \rightarrow 3} x^2-3x+9$$

$$(-3)^2 - 3(-3) + 9$$

$$9 + 9 + 9$$

$$27$$

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Technique #2: Factoring/Canceling

$$\lim_{x \rightarrow 3} \frac{x^3+27}{x+3}$$

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Technique #3: Rationalizing

$$\lim_{x \rightarrow 0} \frac{(\sqrt{7-x} - \sqrt{7})}{x} \cdot \frac{(\sqrt{7-x} + \sqrt{7})}{(\sqrt{7-x} + \sqrt{7})} = \frac{7-x-7}{x(\sqrt{7-x} + \sqrt{7})} = \frac{-x}{x(\sqrt{7-x} + \sqrt{7})} = \frac{-1}{\sqrt{7-x} + \sqrt{7}}$$

$$\lim_{x \rightarrow 0} \frac{-1}{\sqrt{7-x} + \sqrt{7}} = \frac{-1}{2\sqrt{7}}$$

$x^2 - 9 = (x+3)(x-3)$

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Technique #4: Find Common Denominator

$$\lim_{x \rightarrow 0} \left(\frac{8}{x-8} + \frac{1}{8} \right) = \frac{8}{8(x-8)} + \frac{x-8}{8(x-8)} = \frac{x}{8(x-8)} \div x$$

$$= \frac{x}{8(x-8)} \cdot \frac{1}{x} = \frac{1}{8(x-8)}$$

$$\lim_{x \rightarrow 0} \frac{1}{8(x-8)} = \frac{1}{8(-8)} = -\frac{1}{64}$$

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$$\lim_{x \rightarrow 3} \frac{x^2 + 1}{x}$$

$$\lim_{x \rightarrow 3} \frac{x^3 + 27}{x + 3}$$

$$\lim_{x \rightarrow 0} \frac{\sqrt{7-x} - \sqrt{7}}{x}$$

$$\lim_{x \rightarrow 0} \frac{4-x}{x}$$

$$\lim_{x \rightarrow 0} \frac{1}{4-x} - \frac{1}{x}$$

$$\lim_{x \rightarrow 0} \frac{1 \cdot x + (-1)(4-x)}{(4-x)x} = \frac{x - 4 + x}{x(4-x)} = \frac{2x-4}{x(4-x)} \cdot \frac{1}{x}$$

$$\lim_{x \rightarrow 0} \frac{2x-4}{x^2(4-x)} = \frac{-4}{0} = \text{DNE}$$

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Show all work for Page 8 on separate sheet of paper; packet due tomorrow

Solutions to Limit Worksheet Page 8:

- 1) 5
- 2) 3/5
- 3) DNE
- 4) 4/5
- 5) 6/5
- 6) DNE
- 7) 8
- 8) 1/2
- 9) 1/12
- 10) 0
- 11) 1/6
- 12) -1/9
- 13) -1/16
- 14) 1/(2√2) or √2/4

Remember how to factor a cubic:

$$(a^3 + b^3) = (a + b)(a^2 - ab + b^2)$$

$$(a^3 - b^3) = (a - b)(a^2 + ab + b^2)$$

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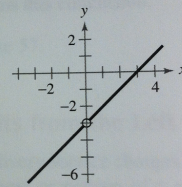
Recall your trig identities
(write these in terms of $\sin x$ and $\cos x$):

$\csc(x) =$ $\sec(x) =$

$\tan(x) =$ $\cot(x) =$

In Exercises 1–4, use the graph to determine each limit (if it exists). Then identify another function that agrees with the given function at all but one point.

2. $h(x) = \frac{x^2 - 3x}{x}$



$\lim_{x \rightarrow -2} h(x)$

$\lim_{x \rightarrow 0} h(x)$

$\lim_{x \rightarrow 3} h(x)$

p. 798, #1 (HW)

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Example | p. 799, #72

$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

$f(x) = \sqrt{x-2}$

p. 799, #69 (HW)

#77: Find velocity when $t=1$ $s(t) = -16t^2 + 128$

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HOMEWORK

**...more algebraic limits
{No school Monday}**

11.2 (p798): 1-11 odd, 17-27 odd, 53, 57, 69-77 odd

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