

Name: _____
AP Calculus AB

Date: _____
Ms. Loughran

Do Now:

Evaluate each of the following

1. $\lim_{x \rightarrow 6} 3\pi = 3\pi$

* the limit of a constant is the constant

2. $\lim_{x \rightarrow 2} \frac{x^3 - 3x^2 - 4x + 12}{x^3 - 8}$

$(x^2 - 4)(x - 3)$
 $x^2(x - 3) - 4(x - 3)$

$$\lim_{x \rightarrow 2} \frac{(x-2)(x+2)(x-3)}{(x-2)(x^2+2x+4)}$$

$$\lim_{x \rightarrow 2} \frac{(x+2)(x-3)}{(x^2+2x+4)} = \frac{-4}{12} = -\frac{1}{3}$$

Name: _____
AP Calc Evaluating Limits 2

Date: _____
Ms. Loughran

Evaluate the limit, if it exists.

$$2. \lim_{h \rightarrow 0} \frac{(2+h)^3 - 8}{h} = \lim_{h \rightarrow 0} \frac{((2+h) - 2) \left((2+h)^2 + 2(2+h) + 4 \right)}{h}$$
$$\lim_{h \rightarrow 0} \frac{\cancel{h} \left((2+h)^2 + 2(2+h) + 4 \right)}{\cancel{h}} = 12$$

$$4. \lim_{x \rightarrow 9} \sqrt{x} = 3$$

$$6. \lim_{x \rightarrow 0} \left(\frac{x}{\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}} \right)$$
$$\lim_{x \rightarrow 0} \frac{x\sqrt{x}}{x} = 0$$

$$8. \lim_{x \rightarrow 0} \frac{x-2}{\sqrt{x^2-4}} \quad \text{dne}$$

$$10. \lim_{x \rightarrow 1} \frac{(x^2-1) \cdot (\sqrt{x}+1)}{(\sqrt{x}-1) \cdot (\sqrt{x}+1)}$$
$$\lim_{x \rightarrow 1} \frac{\cancel{(x+1)} \cancel{(x-1)} (\sqrt{x}+1)}{\cancel{(x-1)} (\sqrt{x}+1)} = 4$$
$$\text{or}$$
$$\lim_{x \rightarrow 1} \frac{x^2-1}{\sqrt{x}-1} = \lim_{x \rightarrow 1} \frac{(x+1)(x-1)}{\sqrt{x}-1} = \lim_{x \rightarrow 1} \frac{(x+1)(\sqrt{x}+1)\cancel{(\sqrt{x}-1)}}{\sqrt{x}-1} = 4$$

$$12. \lim_{x \rightarrow 1} \frac{1 - \sqrt{x}}{1 - x} = \frac{1}{2}$$

$(1 - \sqrt{x})(1 + \sqrt{x})$

$$14. \lim_{x \rightarrow 4} \frac{2 - \sqrt{x}}{4 - x} = \frac{1}{4}$$

$(2 - \sqrt{x})(2 + \sqrt{x})$

$$16. \lim_{h \rightarrow 0} \left(\frac{\sqrt{1+h} - 1}{h} \cdot \frac{(\sqrt{1+h} + 1)}{(\sqrt{1+h} + 1)} \right)$$

$$\lim_{h \rightarrow 0} \frac{1+h-1}{h(\sqrt{1+h} + 1)} = \lim_{h \rightarrow 0} \frac{1}{(\sqrt{1+h} + 1)} = \frac{1}{2}$$

$$18. \lim_{x \rightarrow -4} \frac{\frac{1}{4} + \frac{1}{4x}}{(4+x)4x}$$

$$\lim_{x \rightarrow -4} \frac{x+4}{4x(4+x)} = \frac{1}{-16}$$

$$20. \lim_{x \rightarrow 0} \frac{(3+x)^{-1} - 3^{-1}}{x}$$

$$\lim_{x \rightarrow 0} \left(\frac{\frac{1}{3+x} - \frac{1}{3}}{x} \right)$$

$$\lim_{x \rightarrow 0} \frac{3 - (3+x)}{3x(3+x)}$$

$$\lim_{x \rightarrow 0} \frac{-x}{3x(3+x)} = \frac{-1}{9}$$