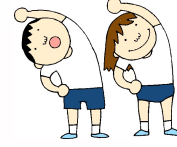


# WARM UP!!



1) Find the slope of the line through each pair of points:

a)  $f(x) = 3x^2 + x - 1$  ;  $(a, f(a))$  and  $(a + h, f(a + h))$

~~b)  $f(x) = \frac{2x}{x+1}$  ;  $(a, f(a))$  and  $(a + h, f(a + h))$~~

2) Give the x-values for which  $f(x) = \frac{x^2 + 5x + 6}{x^3 - x^2 - 12x}$  is discontinuous and state why. Identify any removable discontinuities and state why.

3) Find the following limits:

a)  $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 2x}$

b)  $\lim_{\varphi \rightarrow \pi} \varphi \sec \varphi$

c)  $\lim_{x \rightarrow 0} \frac{\sqrt{5+x} - \sqrt{5}}{3x}$

~~$\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 2x}$~~

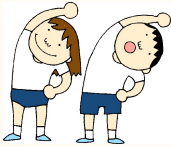
e)  $\lim_{x \rightarrow 2^-} \frac{x+3}{2-x}$

f)  $\lim_{x \rightarrow 4} \frac{x+3}{4-x}$

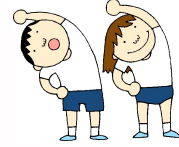
4) If  $f(x)$  is continuous and  $f(x) = \begin{cases} x^2 - x, & x < 2 \\ 2x + k, & x \geq 2 \end{cases}$ , what is k?

See next page for answers

$x = -3$  is a removable discont b/c  $\lim_{x \rightarrow -3} f(x)$  exists



# WARM UP!!



1) Find the slope of the line through each pair of points:

a)  $f(x) = 3x^2 + x - 1$ ;  $(a, f(a))$  and  $(a+h, f(a+h))$

~~$f(x) = \frac{2x}{x-1}$ ;  $(a, f(a))$  and  $(a+h, f(a+h))$~~

2) Give the x-values for which  $f(x) = \frac{x^2+5x+6}{x^3-x^2-12x}$  is discontinuous and state why. Identify any removable discontinuities and state why.

3) Find the following limits:

a)  $\lim_{x \rightarrow 0} \frac{\sin 3x}{\sin 2x}$   
 $= \lim_{x \rightarrow 0} \frac{2x}{\sin 2x} \cdot \frac{\sin 3x}{3x} \cdot \frac{3}{2} = \frac{3}{2}$

b)  $\lim_{\phi \rightarrow \pi} \phi \sec \phi$   
 $\rightarrow = \pi \sec \pi = -\pi$

c)  $\lim_{x \rightarrow 0} \frac{\sqrt{5+x}-\sqrt{5}}{3(\sqrt{5+x}+\sqrt{5})} = \frac{1}{6\sqrt{5}}$

$\lim_{x \rightarrow 0} \frac{\sqrt{5+x}-\sqrt{5}}{3x} \cdot \frac{\sqrt{5+x}+\sqrt{5}}{\sqrt{5+x}+\sqrt{5}}$

e)  $\lim_{x \rightarrow 2^-} \frac{x+3}{2-x} = \infty$  f)  $\lim_{x \rightarrow 4} \frac{x+3}{4-x} = \text{DNE}$

4) If  $f(x)$  is continuous and  $f(x) = \begin{cases} x^2 - x, & x < 2 \\ 2x + k, & x \geq 2 \end{cases}$ , what is  $k$ ?  $f(2) = 4+k$

(a)  $\frac{3(a+h)^2 + a+h-1 - (3a^2+a-1)}{a+h-a}$   
 $= \frac{3(a^2+2ah+h^2) + a+h-1 - 3a^2-a+1}{h}$   
 $= \frac{6ah+3h^2+h}{h} = 6a+3h+1$

$\lim_{x \rightarrow 2^-} f(x) = 2$   
 $\lim_{x \rightarrow 2^+} f(x) = 4+k$   
 $4+k = 2$   
 $k = -2$

(2)  $f(x) = \frac{x^2+5x+6}{x^3-x^2-12x} = \frac{(x+2)(x+3)}{x(x-4)(x+3)}$

$f(x)$  is discont at  $x=0, 4, -3$  b/c  $f(0), f(4),$  and  $f(-3)$  are und.

$x=-3$  is a removable discont b/c  $\lim_{x \rightarrow -3} f(x)$  exists

