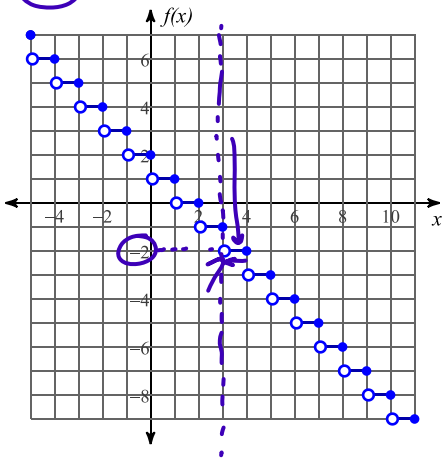
Calculus Name _____

Limits and Continuity Test Review *No Calculators* Date _____ Period ____

Evaluate each limit.

1) $\lim_{x \to 3^+} \lfloor -x + 2 \rfloor$ $= -2$



2) $\lim_{x \to 7} \frac{x-7}{2-\sqrt{x-3}} \to \frac{0}{0}$ Indeterminate

$\frac{(x-7)}{(2-\sqrt{x-3})} \cdot \frac{(2+\sqrt{x-3})}{(2+\sqrt{x-3})} = \frac{(x-7)(2+\sqrt{x-3})}{4-(x-3)}$ → "4−x+3"

→ $\frac{(x-7)(2+\sqrt{x-3})}{7-x-1(x-7)}$

→ $\frac{2+\sqrt{x-3}}{-1} \to \frac{2+\sqrt{7-3}}{-1} = -4$

3) $\lim_{t \to -\infty} \frac{\sqrt{2t^2+2}}{4t+2}$

Since EBM is all I need

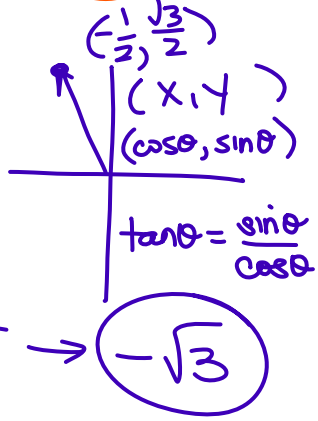
$\frac{\sqrt{2t^2+2}}{4t+2}$ acts like $\frac{\sqrt{2t^2}}{4t} \to \frac{\sqrt{2} \cdot t}{4t}$

→ $-\frac{\sqrt{2}}{4}$

4) $\lim_{x \to \frac{2\pi}{3}} \tan(x)$

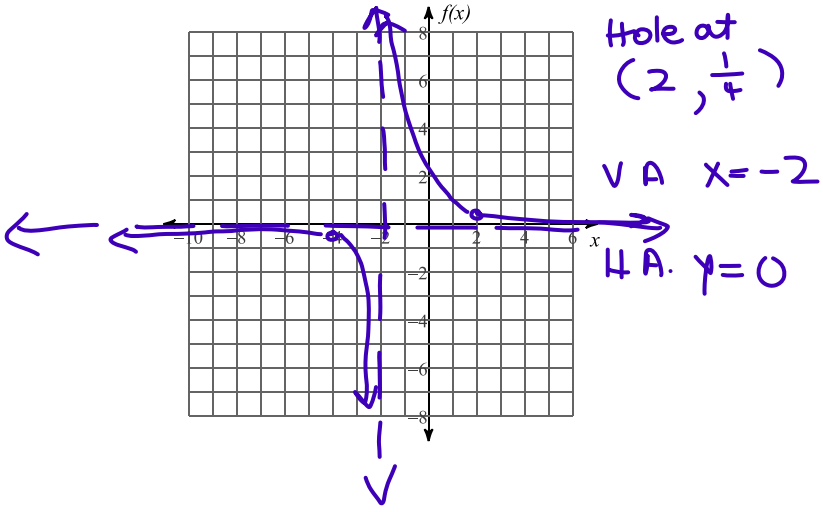
$\tan\left(\frac{2\pi}{3}\right)$

$= \frac{\sin(2\pi/3)}{\cos(2\pi/3)} = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} \to -\sqrt{3}$

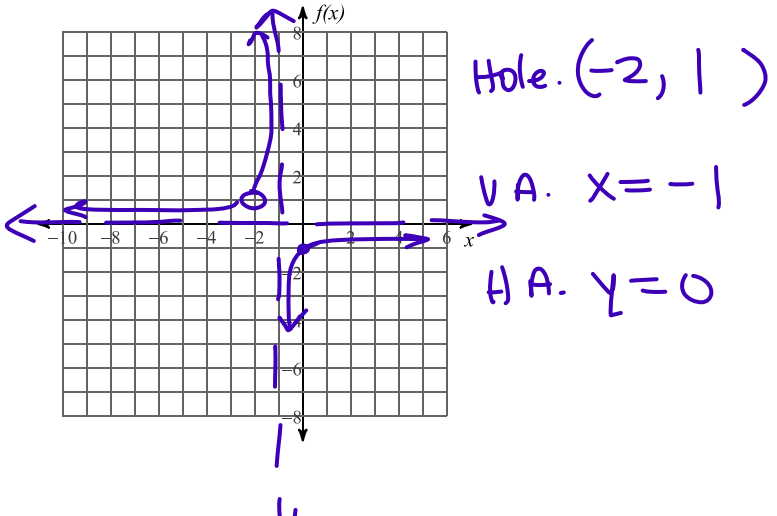


Evaluate each limit and sketch the function labeling asymptotes and holes.

5) $\lim_{x \to -2} \frac{x-2}{x^2-4}$ $\frac{x-2}{(x+2)(x-2)} = \frac{1}{x+2}$



6) $\lim_{x \to -2} -\frac{x+2}{x^2+3x+2}$ $\frac{-(x+2)}{(x+1)(x+2)} \to \frac{-1}{x+1}$



Find the intervals on which each function is continuous.

7) $f(x) = \dfrac{x+5}{x^2-3x}$ → $\dfrac{x+5}{x(x-3)}$

$x = 0, 3$ $\quad (-\infty, 0) \cup (0, 3) \cup (3, \infty)$

Determine if each function is continuous. If the function is not continuous, find the *x*-axis location of and classify each discontinuity.

piecewise

8) $f(x) = \begin{cases} 2, & x \le 1 \\ \dfrac{x}{2} + \dfrac{1}{2}, & x > 1 \end{cases}$

1st equation 2

2nd equation $\frac{1}{2} + \frac{1}{2} = 1$

Not continuous b/c at $x=1$, there is a jump

9) $f(x) = \dfrac{x+2}{2x^2+2x+1}$

Continuous → $\dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$ → $\dfrac{-2 \pm \sqrt{2^2-4(2)(1)}}{2(2)}$ → $\dfrac{-2 \pm \sqrt{4-8}}{4} \to \dfrac{-2 \pm \sqrt{-4}}{4}$

Find all vertical and horizontal asymptotes of each function.

10) $h(x) = \dfrac{x^2-4}{\sqrt{2x^4+4}}$

EBM $\dfrac{x^2}{\sqrt{2x^4}}$ ↓ $\dfrac{x^2}{\sqrt{2}\,x^2} \to \dfrac{1}{\sqrt{2}}$

H A $y = \frac{1}{\sqrt{2}}$ (Both sides)

$\sqrt{2x^4+4} = 0$

$2x^4+4=0$

$2x^4=-4$

$x^4=-2$

No solution

No V.A

(no 0 is denominator)

11) $h(x) = \dfrac{3x-21}{x^2+4x-6}$

Quadratic Formula $\dfrac{-4 \pm \sqrt{4^2-4(1)(-6)}}{2(1)}$

$\dfrac{-4 \pm \sqrt{16+24}}{2} \to \dfrac{-4 \pm \sqrt{40}}{2} \to \dfrac{-4 \pm \sqrt{4 \cdot 10}}{2}$

$\to \dfrac{-4 \pm 2\sqrt{10}}{2} \to -2 \pm 1\sqrt{10}$

V A (2) $x = -2 \pm \sqrt{10}$

H A $y = 0$

12) Find all the vertical asymptotes for the function

$$f(x) = \frac{1}{2\cos^2 x + (2-\sqrt{3})\cos x - \sqrt{3}} \text{ where } 0 < x \le 2\pi$$

$2\cos x - \sqrt{3} = 0$ $\quad \cos x + 1 = 0$

$2\cos x = \sqrt{3}$

$(2\cos x - \sqrt{3})(\cos x + 1) = 0$

$\cos x = \frac{\sqrt{3}}{2}$ $\quad \cos x = -1$

$x = \frac{\pi}{6}, \frac{11\pi}{6}$ $\quad x = \pi$