Name KEY **Honors Calc (Limits Assessment)**

1) Find the limits (if they exist) for the graph of f(x) below.

$\lim_{x \to -4^-} f(x) =$ 0

$\lim_{x \to -4^+} f(x) =$ 3

$\lim_{x \to -4} f(x) =$ D.N.E

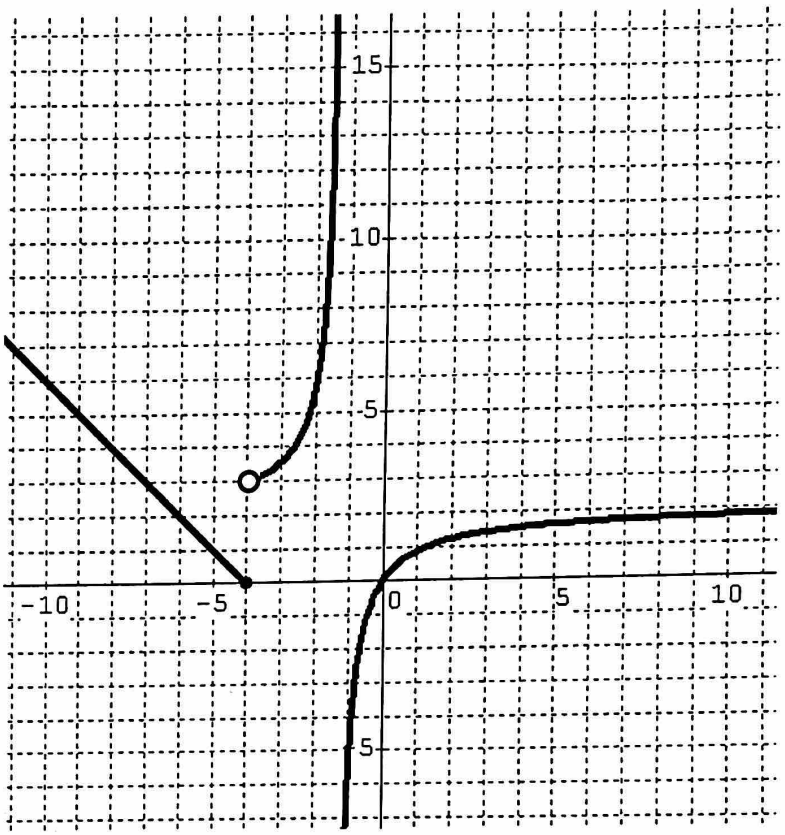
$\lim_{x \to -\infty} f(x) =$ ∞ or D.N.E

$\lim_{x \to \infty} f(x) =$ 2

$\lim_{x \to 0} f(x) =$ 0

$\lim_{x \to -1^-} f(x) =$ ∞ or D.N.E

$\lim_{x \to -1^+} f(x) =$ $-\infty$ or D.N.E



EVALUATE EACH LIMIT

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

$= 3(1)^3 - 2(1)^2 + 6(1) + 1$

$= 3(1) - 2(1) + 6 + 1$

$= 3 - 2 + 6 + 1$

$= 8$

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

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

$= \frac{2(9) + 2}{-6}$

$= \frac{18+2}{-6} = \frac{20}{-6} = -\frac{10}{3}$

4) $\lim_{x \to 2} \frac{x+1}{x+4}$

$= \frac{2+1}{2+4} = \frac{3}{6} = \frac{1}{2}$

5) $\lim_{x \to 4} \frac{x-4}{x^2 - 6x + 8}$

$= \frac{1(x-4)}{(x-4)(x-2)}$

$= \frac{1}{x-2} = \frac{1}{4-2} = \frac{1}{2}$

6) $\lim_{x \to 5} \dfrac{x^2 - x - 20}{x^2 + 3x - 40} = \dfrac{(x-5)(x+4)}{(x-5)(x+8)} = \dfrac{x+4}{x+8} = \dfrac{5+4}{5+8} = \dfrac{9}{13}$

7) $\lim_{x \to \frac{\pi}{6}} 2\sin x = 2\sin\left(\dfrac{\pi}{6}\right) = 2\left(\dfrac{1}{2}\right) = 1$

8) $\lim_{x \to \frac{\pi}{4}} \dfrac{\tan x}{\sin x} = \dfrac{\tan\left(\frac{\pi}{4}\right)}{\sin\left(\frac{\pi}{4}\right)} = \dfrac{1}{\left(\frac{\sqrt{2}}{2}\right)} = \dfrac{2}{\sqrt{2}} = \dfrac{2\sqrt{2}}{\sqrt{2}\sqrt{2}} = \dfrac{\cancel{2}\sqrt{2}}{\cancel{2}} = \sqrt{2}$

9) $\lim_{x \to 4} \dfrac{x-4}{\sqrt{x}-2} \Rightarrow \dfrac{(x-4)(\sqrt{x}+2)}{(\sqrt{x}-2)(\sqrt{x}+2)}$ ⇒ Still gives "0" in denominator

(DISTRIBUTE)

$\Rightarrow \dfrac{x\sqrt{x} + 2x - 4\sqrt{x} - 8}{(x-4)}$ $\Rightarrow \dfrac{x\sqrt{x} - 4\sqrt{x} + 2x - 8}{(x-4)} \Rightarrow$

$\Rightarrow \dfrac{\sqrt{x}(x-4) + 2(x-4)}{(x-4)}$ $\Rightarrow \dfrac{(x-4)(\sqrt{x}+2)}{(x-4)} \Rightarrow \sqrt{x}+2$

$\Rightarrow \sqrt{4} + 2 = 2 + 2$ $\Rightarrow 4$

10) $\lim_{x \to 0} \dfrac{\sqrt{4+x} - 2}{x} = \dfrac{(\sqrt{4+x} - 2)}{x} \cdot \dfrac{(\sqrt{4+x} + 2)}{(\sqrt{4+x} + 2)}$

$\Rightarrow \dfrac{(4+x) - 4}{x(\sqrt{4+x} + 2)} \Rightarrow \dfrac{x \cdot 1}{x(\sqrt{4+x} + 2)}$

$\Rightarrow \dfrac{1}{\sqrt{4+x} + 2} \Rightarrow \dfrac{1}{\sqrt{4+0} + 2}$

$\Rightarrow \dfrac{1}{\sqrt{4} + 2} \Rightarrow \dfrac{1}{2+2} = \dfrac{1}{4}$

11) $\lim_{x \to 16} \dfrac{\sqrt{x} - 4}{x - 16} = \dfrac{(\sqrt{x} - 4)}{x - 16} \cdot \dfrac{(\sqrt{x} + 4)}{(\sqrt{x} + 4)} \Rightarrow \dfrac{(x - 16) \cdot 1}{(x - 16)(\sqrt{x} + 4)}$

$\Rightarrow \dfrac{1}{\sqrt{x} + 4} \Rightarrow \dfrac{1}{\sqrt{16} + 4} \Rightarrow \dfrac{1}{4+4} = \dfrac{1}{8}$