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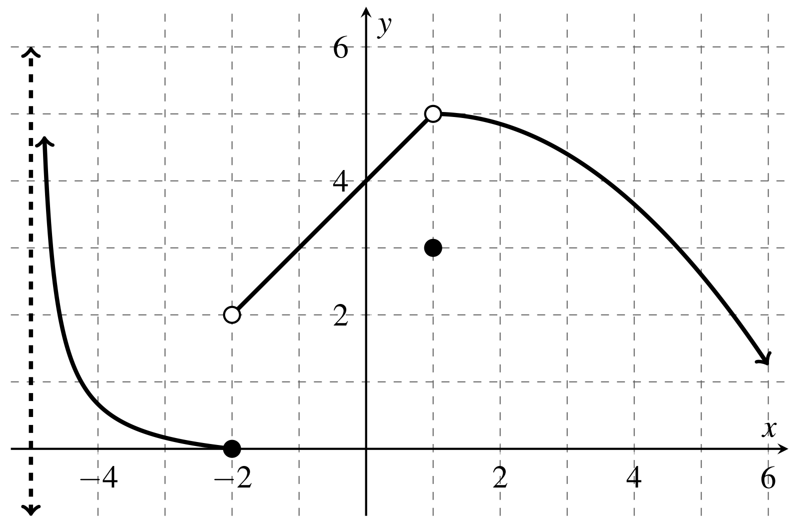
There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. (10 points) The function $H(x)$ has domain $(-5, \infty)$ and has a vertical asymptote at $x = -5$. Use the graph of $H(x)$ to answer each question below. If the limit is infinite, indicate that with ∞ or $-\infty$.

$H(x)$



(a) $H(-2) =$ 0 (b) $H(1) =$ 3 (c) $\lim_{x \to -2^+} H(x) =$ 2

(d) $\lim_{x \to -2} H(x) =$ DNE (e) $\lim_{x \to -5^+} H(x) =$ $+\infty$ (f) $\lim_{x \to 1} H(x) =$ 5

(g) Estimate $H(4)$. ≈ 3.6

(h) Evaluate $\lim_{x \to 0}(5H(x) + 2)$. $= 5 \cdot 4 + 2 = 22$

(i) List all x-values in the domain of $H(x)$ for which the function $H(x)$ fails to be continuous.

$x = -2$, $x = 1$

2. (3 points) If $\lim_{x \to -2} f(x) = 3$ and $\lim_{x \to -2} g(x) = 5$, is it possible to evaluate $\lim_{x \to -2} \frac{f(x)+1}{xg(x)}$? If so evaluate the limit. If not, explain why.

$$\lim_{x \to -2} \frac{f(x)+1}{x \cdot g(x)} = \frac{3+1}{-2 \cdot 5} = \frac{4}{-10} = -\frac{2}{5}$$

3. (8 points) Use algebra to evaluate the limits below. You must show your work to earn full credit **and** your work will be graded. (That is, you need to write your mathematics correctly.)

(a) $\lim\limits_{x\to\sqrt{7}} \frac{x-\sqrt{7}}{x^2-7} =$ $\lim\limits_{x\to\sqrt{7}} \frac{x-\sqrt{7}}{(x-\sqrt{7})(x+\sqrt{7})}$

$= \lim\limits_{x\to\sqrt{7}} \frac{1}{x+\sqrt{7}} = \frac{1}{\sqrt{7}+\sqrt{7}} = \frac{1}{2\sqrt{7}}$

(b) $\lim\limits_{h\to 0} \frac{(a+h)^2-a^2}{h} =$ $\lim\limits_{h\to 0} \frac{a^2+2ah+h^2-a^2}{h} = \lim\limits_{h\to 0} \frac{2ah+h^2}{h}$

$= \lim\limits_{h\to 0} 2a+h = 2a+0 = 2a$

4. (4 points) Let $f(x) = \begin{cases} 2-x^2 & x<0 \\ e^x & x\geq 0 \end{cases}$.

(a) Find $\lim\limits_{x\to 0^-} f(x)$. $= \lim\limits_{x\to 0^-} 2-x^2 = 2$

(b) Find $\lim\limits_{x\to 0^+} f(x)$. $= \lim\limits_{x\to 0^+} e^x = e^0 = 1$

(c) Use your answers to parts (a) and (b) to justify whether $f(x)$ is or is not continuous at $x=0$.

f(x) is not continuous at x=0 because the $\lim\limits_{x\to 0} f(x)$ does not exist.