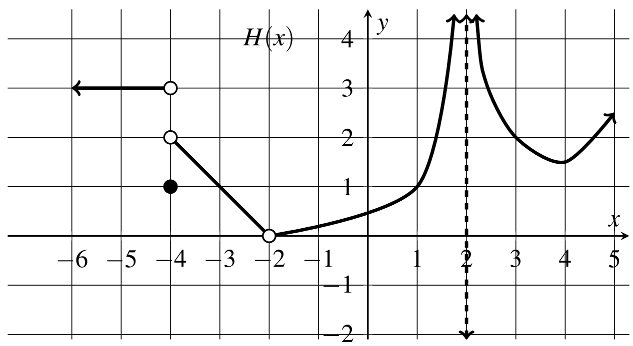
Name: ______________________________ ________ / 25

Please circle your instructor's name: Leah Berman Jill Faudree James Gossell

There are 25 points possible on this quiz. Any outside materials (textbook, course notes, calculator) are not allowed. **For full credit, show all work in a way someone else can follow it.**

1. (13 points) The graph of a function $H(x)$ is shown below. Use the graph of $H(x)$ to answer each question below. If the limit is infinite, indicate that with ∞ or $-\infty$. If the value does not exist or is undefined, write DNE.



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

(d) $H(-4) =$ ______ (e) $\lim_{x\to -4^+} H(x) =$ ______ (f) $\lim_{x\to -4^-} H(x) =$ ______

(g) $\lim_{x\to 2} H(x) =$ ______

(h) Based on the information from the graph, write the domain of $H(x)$ using interval notation:

____

(i) Observe from the graph that $\lim_{x\to 3} H(x) = 2$.

Determine $\lim_{x\to 3} \dfrac{5H(x)-1}{x^2 H(x)} =$

(j) List all **x-values** in the set $(-\infty,\infty)$ where the function $H(x)$ is not continuous.

$x =$ ______________________________

2. (6 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** clearly and correctly. If you do not write $\lim\limits_{x\to\dots}\cdots$ where it is necessary your answer will not be completely correct.)

   (a) $\lim\limits_{x\to 3}\dfrac{x^2+x-6}{(x+3)^2} =$

   (b) $\lim\limits_{h\to 0}\dfrac{\frac{4}{h+5}-\frac{4}{5}}{h} =$

3. (6 points) Let

$$f(x) = \begin{cases} \frac{x^2+4x-5}{(x+6)(x-1)} & x < 1 \\ 3\ln(x) & x \geq 1 \end{cases}.$$

   Show your work clearly, using limit notation, to answer the following:

   (a) $\lim\limits_{x\to 1^-} f(x) =$

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

   (c) $f(1) =$

   (d) Based on your answers to parts (a), (b) and (c), **check the true statement(s) below**:

   - ☐ f is continuous at $x = 1$.
   - ☐ f has a removable discontinuity at $x = 1$.
   - ☐ f has a jump discontinuity at $x = 1$.
   - ☐ f has an infinite discontinuity at $x = 1$.
   - ☐ None of the above.