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PRINT YOUR NAME : ______________________________

From the questions below, please solve all 5 problems.
The homework is worth 10 points. Each question is worth 2 points.
Show all of your work and put a box around your final answer.
Number each attempted question clearly.
Write legibly (that is, suitably large and suitably dark); if the grader can't read your answer, it's consider uncompleted.

1. Let $f(x) = x\dfrac{|x-1|}{x-1}$.
Complete the following table of values.

x	0.9	0.99	0.999	1.001	1.01	1.1
$f(x)$						

Use the table above to evaluate each of the following limits.

(a) $\lim_{x\to 1+} f(x)$,

(b) $\lim_{x\to 1^-} f(x)$,

(c) $\lim_{x\to 1} f(x)$.

(d) Use Desmos to sketch the graph. Does the graph confirm your answer? Explain.

2. Evaluate the limit assuming that $\lim_{x\to -4} f(x) = 3$ and $g(x) = 1$.

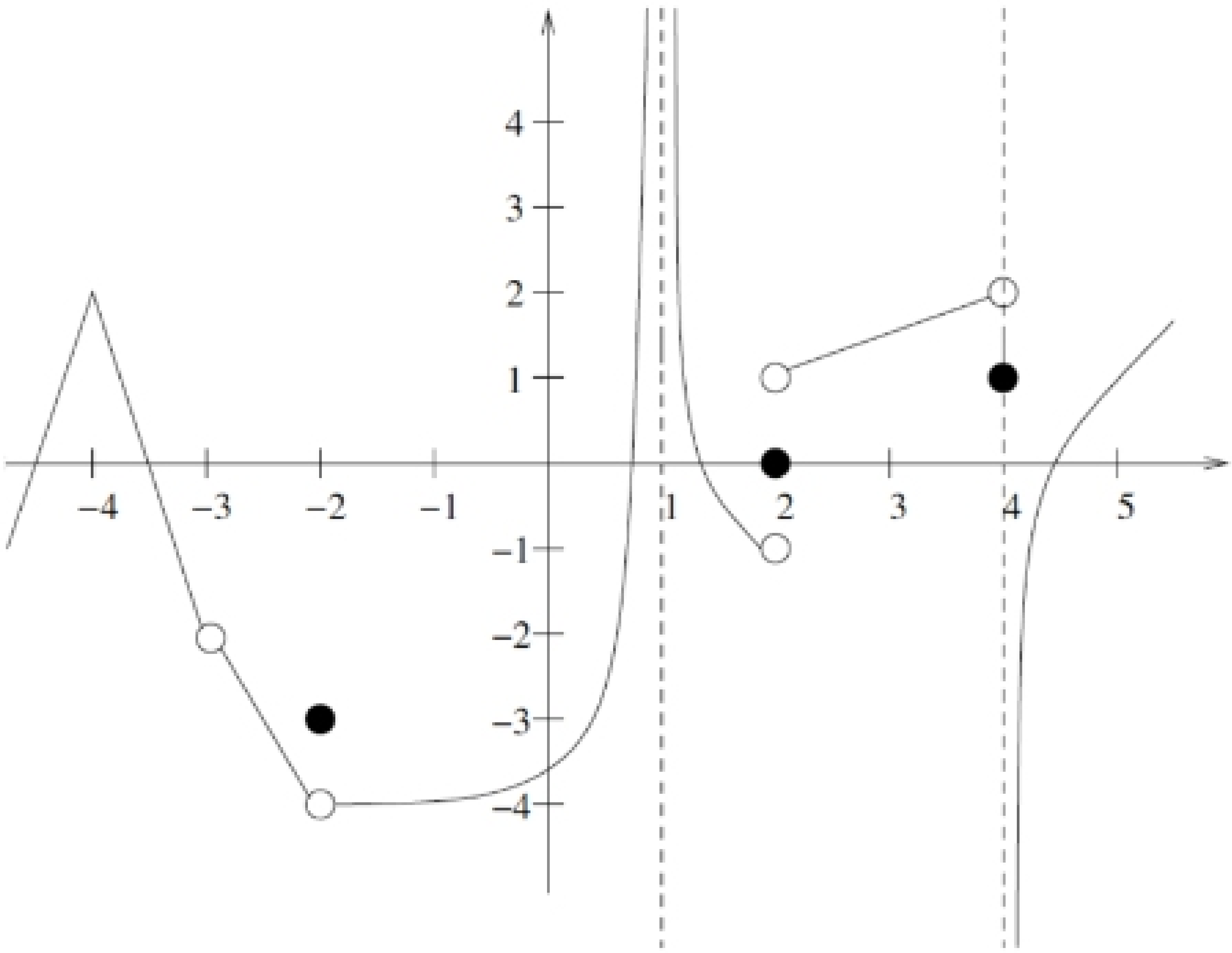
(a) $\lim_{x\to -4} f(x)g(x)$

(b) $\lim_{x\to -4} (2f(x) + 3g(x))$

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

(d) $\lim_{x\to -4} \dfrac{g(x)}{x^2}$

(e) $\lim_{x\to -4} \dfrac{f(x)+1}{g(x)-9}$



graph.png

3. From the above graph of $y = f(x)$, find the following limits:

(a) $\lim_{x \to -4} f(x) =$ (b) $\lim_{x \to -3} f(x) =$ (c) $\lim_{x \to -2} f(x) =$ (d) $\lim_{x \to 1} f(x) =$

(e) $\lim_{x \to 2} f(x) =$ (f) $\lim_{x \to 4^-} f(x) =$ (g) $\lim_{x \to 4^+} f(x) =$ (h) $\lim_{x \to 4} f(x) =$

4. Let $f(x) = 6$ and $g(x) = 4x + 1$. Use the limit definition to verify the following limits:

(a) $\lim_{x \to 8} f(x) = 6$

(b) $\lim_{x \to 4} g(x) = 17$

5. Suppose f, g, h, i, j, k are functions satisfying

- $\lim_{x \to 2} f(x) = \lim_{x \to 2} g(x) = \infty$,
- $h(x) > 0$ for all $x \neq 2$ and $\lim_{x \to 2} h(x) = 0$,
- $\lim_{x \to 2} i(x) = 3$,
- $j(x)$ is a polynomial and $j(2) = 5$,
- $k(x) = \dfrac{(x-2)j(x)}{x-2}$.

If possible, calculate the following limits or determine that they do not exist. Classify infinite limits if possible. If there is not enough information to determine what happens, find examples that illustrate that different behavior is possible.

a. $\lim_{x \to 2}(i(x) + j(x))$

b. $\lim_{x \to 2}(i(x)j(x))$

c. $\lim_{x \to 2}\left(\dfrac{i(x)}{h(x)}\right)$

d. $\lim_{x \to 2}\left(\dfrac{i(x)}{f(x)}\right)$

e. $\lim_{x \to 2}(f(x) + g(x))$

f. $\lim_{x \to 2}(f(x) - g(x))$

g. $\lim_{x \to 2}(f(x)g(x))$

h. $\lim_{x \to 2}\left(\dfrac{f(x)}{g(x)}\right)$

i. $\lim_{x \to 2}(f(x) + i(x))$

j. $\lim_{x \to 2}(f(x)i(x))$

k. $\lim_{x \to 2}(f(x)h(x))$

l. $\lim_{x \to 2} k(x)$

m. True or false: $k(x) = j(x)$ for all x.