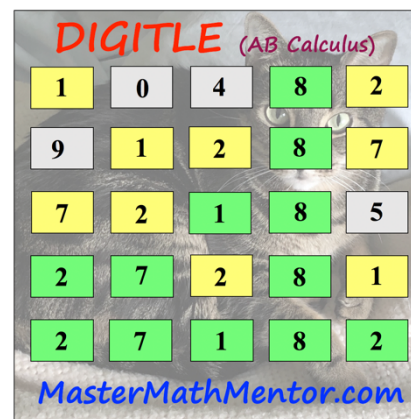


DIGITLE – AB CALCULUS

Puzzle 102 - Limits



Directions: The first 5 problems have single digit answers. The 6th problem has a 5-digit answer (counting leading zeros if present). You have a choice: solve the easier single-digit answer problems or tackle the more difficult 5-digit answer. Once you have done that, attempt to solve the puzzle by entering the following url on your computer, tablet, or phone:

<https://mastermathmentor.com/mmm/digitle.ashx>.

The correct puzzle answer will be the digits of your answer(s) scrambled. Use the following interpretation. You get 6 tries.

Green : the digit is in the answer and is in the correct spot.

Yellow: the digit is in the answer but is not in the correct spot.

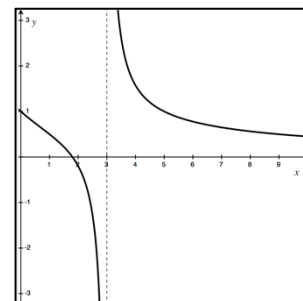
Grey : the digit is not in the answer.

Single Digit Answers:

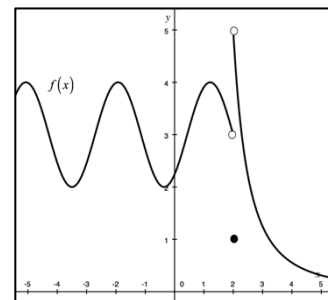
1) Find $\lim_{x \rightarrow 0} \frac{x^4 + 8x^3 + 30x^2}{2x^4 + 4x^3 + 5x^2}$

2) Find $\lim_{x \rightarrow -\infty} \frac{(2x-5)(7x^2-12)}{(x+2)^2(2x-3)}$

3) The function f is given by $f(x) = \frac{5x-9}{x^2-a}$. The figure to the right shows a portion of the graph of f . Which of the following could be the values of the constants a ?



4) A calculus teacher gives students a graph as shown on the right and asks them to find five limits. If the student gets an answer correct, he receives 2 points. If the student gets the problem wrong, he gets a deduction of 1 point. If the student doesn't attempt the problem, he gets no points. What would be the score of a student who answered the following?



$\lim_{x \rightarrow 2^-} f(x)$ exists $\lim_{x \rightarrow 2^+} f(x)$ exists $\lim_{x \rightarrow 2} f(x)$ exists

$\lim_{x \rightarrow -\infty} f(x)$ not answered $\lim_{x \rightarrow \infty} f(x)$ exists

5) Find $\lim_{x \rightarrow 0} \frac{x}{2(\sqrt{x+9}-3)}$

5-Digit Answer:

6) $f(x) = \frac{1285 + 3696e^x}{5 - 16e^x}$ has two (possibly different) horizontal asymptotes. Find the absolute value of the product of their locations.