

DIGITLE – AB CALCULUS

Puzzle 109 – Linear Approximations/Inverses

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) For the function f , $f(9) = -1$ and $f'(x) = 46 - 6x$. What is the approximation for $f(8.75)$ found by using the tangent line to the graph of f at $x = 9$?
2. Let g be a function given by $g(x) = x[f(x)]^2$. If $f(1) = 3$ and $f'(1) = -2$, use the tangent line to g at $x = 1$ to approximate $g(2)$.
- 3) For the differentiable function f , $f(-1) = 1$ and $f'(-1) = 8$. Function f is approximated using its tangent line at $x = -1$. For what positive value of k is the approximation to $f(k)$ equal to k^2 ?
- 4) Let $f(x) = 2x^5 + 4x^3 + x + 2$. Find $[f^{-1}]'(2)$.
- 5) The function f is differentiable for all real numbers. The table below gives values of the function and its derivatives at $x = 4$ and $x = -2$. If f^{-1} is the inverse function of f , find the slope of the tangent line to the graph of $y = f^{-1}(x)$ at $x = 4$.

x	$f(x)$	$f'(x)$
-2	4	$\frac{1}{5}$
4	$\frac{2}{3}$	1

5-Digit Answer:

- 6) On a calculator, the square root button doesn't work. So to calculate $2^{\sqrt{210}} + 2^{\sqrt{240}}$, we use the linear approximation to the function $y = \sqrt{x}$ at $x = 225$. Do so, rounding your answer to the nearest integer.