DIGITLE – BC CALCULUS
Puzzle 215 – Taylor Series

Directions: The first 5 problems have single digit or letter answers. The 6th problem has a 3-digit answer (counting leading zeros if present). You have a choice: solve the easier single-character answer problems or tackle the more difficult 3-digit answer and the multiple choice. 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/letters of your answer(s) scrambled. Use the following interpretation. You get 6 tries. Problems should be done without graphing calculators.

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

Single Digit or Letter Answers:

1) What is the coefficient of the 3rd degree term of the Taylor series for $f(x)=-48(3x-1)^{5/3}$ centered at $x = 3$?

2) Write $\dfrac{1-e^{-x}}{x}$ as a power series.

A. $1-\dfrac{x}{2!}+\dfrac{x^2}{3!}-\dfrac{x^3}{4!}+\ldots$

B. $1-\dfrac{x}{2!}+\dfrac{x^2}{3!}-\dfrac{x^3}{4!}+\ldots$

C. $\dfrac{x}{2!}-\dfrac{x^2}{3!}+\dfrac{x^3}{4!}+\ldots$

D. $\dfrac{x}{2!}+\dfrac{x^2}{3!}+\dfrac{x^3}{4!}+\ldots$

3) If $f(x)=9\sin(2x^2)$, approximate $f(1)$ using the 6th degree term for the Maclaurin series for f.

4) Using familiar series, find the 4th degree term of the Taylor series for $f(x)=e^x\cos x$ about $x = 0$.

A. $\dfrac{x^4}{4}$ B. $\dfrac{x^4}{24}$ C. $\dfrac{-5x^4}{24}$ D. $\dfrac{-x^4}{6}$

5) Find the coefficient for the 3rd term of the power series for $f(x)=\dfrac{56}{x+2}$, centered at 0.

Three Digit Answer:

6) The Maclaurin series for $f(x)$ is given by $\dfrac{1}{1\cdot 2!}+\dfrac{x}{2\cdot 3!}+\dfrac{x^2}{3\cdot 4!}+\dfrac{x^3}{4\cdot 5!}+\dfrac{x^4}{5\cdot 6!}\ldots+\dfrac{x^n}{(n+1)(n+2)!}+\ldots$ The value of $f^{(7)}(0)$ can be written as $\dfrac{1}{a}$. Find a.