UNIT 5 – (CALC 25.0) Infinite Series RETEACH

Name ______________________________ PER_______ DATE______________

The Taylor series for $\sin x$ about $x = 0$ is $x - \frac{x^3}{3!} + \frac{x^5}{5!} - \ldots$. If f is a function such that $f'(x) = \sin\left(x^2\right)$, then the coefficient of x^7 in the Taylor series for $f(x)$ about $x = 0$ is

(A) $\frac{1}{7!}$ (B) $\frac{1}{7}$ (C) 0 (D) $-\frac{1}{42}$ (E) $-\frac{1}{7!}$

1. What function is defined by a Taylor series in the problem above?

____

2. What series do you need to answer the question? How do you know?

____

3. What is the Taylor series for f ’(x)? List the first three terms.

____

4. What can we do to the Taylor series of f ‘ (x) to obtain the Taylor series f (x)?

____

QUICK CHECK!

10. For $-1 < x < 1$ if $f(x) = \sum_{n=1}^{\infty} \frac{(-1)^{n+1} x^{2n-1}}{2n-1}$, then $f'(x) =$

(A) $\sum_{n=1}^{\infty} (-1)^{n+1} x^{2n-2}$

(B) $\sum_{n=1}^{\infty} (-1)^{n} x^{2n-2}$

(C) $\sum_{n=1}^{\infty} (-1)^{2n} x^{2n}$

(D) $\sum_{n=1}^{\infty} (-1)^{n} x^{2n}$

(E) $\sum_{n=1}^{\infty} (-1)^{n+1} x^{2n}$

What is the coefficient of x^6 in the Taylor series for $\frac{e^{3x^2}}{2}$ about $x = 0$?

(A) $\frac{1}{1440}$ (B) $\frac{81}{160}$ (C) $\frac{9}{4}$ (D) $\frac{9}{2}$ (E) $\frac{27}{2}$

FRQ!

6. The function g is continuous for all real numbers x and is defined by

$$g(x) = \frac{\cos(2x) - 1}{x^2} \text{ for } x \neq 0.$$

(a) Use L'Hospital's Rule to find the value of $g(0)$. Show the work that leads to your answer.

(b) Let f be the function given by $f(x) = \cos(2x)$. Write the first four nonzero terms and the general term of the Taylor series for f about $x = 0$.

(c) Use your answer from part (b) to write the first three nonzero terms and the general term of the Taylor series for g about $x = 0$.

(d) Determine whether g has a relative minimum, a relative maximum, or neither at $x = 0$. Justify your answer.