AP Questions Tay/Mac #1

Name:__________________________________

1) Use a 6th degree Maclaurin polynomial to approximate cos(.4)

2) What are all values of x for which the series $\sum_{n=2}^{\infty} \frac{(-1)^n}{\ln n} x^n$ converges?

(A) -e < x ≤ e

(B) -1 ≤ x < 1

(C) -e ≤ x < e

(D) -1 < x ≤ 1

(E) -1 ≤ x ≤ 1

3) The Taylor series for $\frac{\sin(x^2)}{x^2}$ centered at x = 0 is

(A) $\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{(2k+1)!}$

(B) $\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k}}{(2k+1)!}$

(C) $\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+1}}{(2k)!}$

(D) $\frac{1}{x} + \sum_{k=1}^{\infty} \frac{(-1)^k x^{2k-1}}{(2k-1)!}$

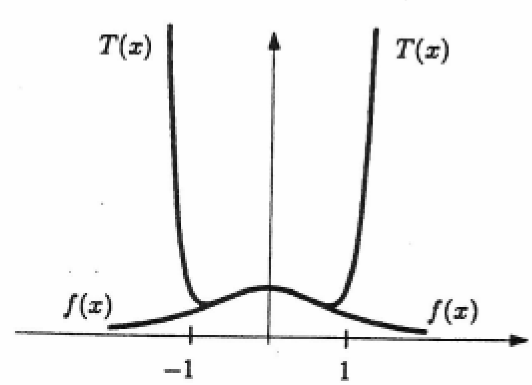
(E) $\sum_{k=0}^{\infty} \frac{(-1)^k x^{4k}}{(2k+1)!}$

4) The figure to the right shows the graph of y = f(x) and y = T(x) where T(x) is a Taylor polynomial for f(x) centered at zero. Which of the following statements are true?

I. T(0.5) is a good approximation for f(0.5)

II. T(1.5) is a good approximation for f(1.5)

III. T(0) = f(0)



(A) I only
(B) II only
(C) III only
(D) I and III only
(E) I, II, and III

5) The first three nonzero terms in the Taylor series about x = 0 of xe^{-x} are

(A) $x - x^2 - \frac{x^3}{2!}$ (B) $x + x^2 + \frac{x^3}{2!}$ (C) $-x + x^2 - \frac{x^3}{2!}$ (D) $x - x^2 + \frac{x^3}{2!}$ (E) $1 - x + \frac{x^2}{2!}$

6) For all x if f(x) = $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} x^{2n+1}}{(2n+1)!}$, then f'(x) =

(A) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} x^{2n}}{(2n+1)!}$ (B) $\sum_{n=0}^{\infty} \frac{(-1)^{n} x^{2n}}{(2n)!}$ (C) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} x^{2n}}{(2n+2)!}$

(D) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} x^{2n}}{(2n)!}$ (E) $\sum_{n=0}^{\infty} \frac{(-1)^{n} x^{2n}}{(2n+1)!}$

7) Let E be the error when the Taylor polynomial T(x) = $x - \frac{x^3}{3!}$ is used to approximate f(x) = sinx at x = 0.5. Which of the following is true?

(A) |E| < 0.0001 (B) 0.0001 < |E| < 0.0003 (C) 0.0003 < |E| < 0.005

(D) 0.005 < |E| < 0.007 (E) 0.07 < |E|

(8) The Taylor Series of a function f(x) about x = 3 is given by

$$f(x) = 1 + \frac{3(x-3)}{1!} + \frac{5(x-3)^2}{2!} + \frac{7(x-3)^3}{3!} + \ldots + \frac{(2n+1)(x-3)^n}{n!} + \ldots$$

What is the value of f'''(3)?

(A) 0
(B) 1.167
(C) 2.5
(D) 5
(E) 7