Tajima HS Solis AP CALC BC

UNIT 5 – Infinite Series Quick Check

Name ________________________ PER________ DATE______________

Complete the problems below and then check your solutions using the answer key on the WEEBLY (Unit 5 Review)

0. (NOTE: While questions like these will not on this week's exam, or on our exam on the day before Bryan's special day, they do serve as a good place to start if you have big questions about fundamental concepts in this Unit.)

Which of the following sequences converge?

I. $\left\{\frac{5n}{2n-1}\right\}$

II. $\left\{\frac{e^n}{n}\right\}$

III. $\left\{\frac{e^n}{1+e^n}\right\}$

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

If $s_n = \left(\frac{(5+n)^{100}}{5^{n+1}}\right)\left(\frac{5^n}{(4+n)^{100}}\right)$, to what number does the sequence $\{s_n\}$ converge?

(A) $\frac{1}{5}$ (B) 1 (C) $\frac{5}{4}$ (D) $\left(\frac{5}{4}\right)^{100}$ (E) The sequence does not converge.

1. (Calc 23.0) Which of the following series is geometric? How you know? Does it converge or diverge? Show your work and box your answer.

I. $\sum_{k=3}^{\infty} \frac{2}{k^2+1}$

II. $\sum_{k=1}^{\infty} \left(\frac{6}{7}\right)^k$

III. $\sum_{k=2}^{\infty} \frac{(-1)^k}{k}$

2. (Calc 23.0) *Show your work and circle the correct answer below.*

The sum of the infinite geometric series $\frac{3}{2}+\frac{9}{16}+\frac{27}{128}+\frac{81}{1,024}+\ldots$ is

(A) 1.60 (B) 2.35 (C) 2.40 (D) 2.45 (E) 2.50

3. (Calc 25.0) *Show your work and circle the correct answer below.*

$\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{n!}$ is the Taylor series about zero for which of the following functions?

(A) $\sin x$ (B) $\cos x$ (C) e^x (D) e^{-x} (E) $\ln(1+x)$

4. (Calc 25.0) *Show your work and circle the correct answer below.*

a.)

A series expansion of $\frac{\sin t}{t}$ is

(A) $1-\frac{t^2}{3!}+\frac{t^4}{5!}-\frac{t^6}{7!}+\cdots$

(B) $\frac{1}{t}-\frac{t}{2!}+\frac{t^3}{4!}-\frac{t^5}{6!}+\cdots$

(C) $1+\frac{t^2}{3!}+\frac{t^4}{5!}+\frac{t^6}{7!}+\cdots$

(D) $\frac{1}{t}+\frac{t}{2!}+\frac{t^3}{4!}+\frac{t^5}{6!}+\cdots$

(E) $t-\frac{t^3}{3!}+\frac{t^5}{5!}-\frac{t^7}{7!}+\cdots$

b.)

$\sin(2x) =$

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

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

(C) $-\frac{(2x)^2}{2!}+\frac{(2x)^4}{4!}-\ldots+\frac{(-1)^n(2x)^{2n}}{(2n)!}+\ldots$

(D) $\frac{x^2}{2!}+\frac{x^4}{4!}+\frac{x^6}{6!}+\ldots+\frac{x^{2n}}{(2n)!}+\ldots$

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

5. (CALC 25.0) *Show your work and circle the correct answer below.*

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

6. (CALC 26.0) *Show your work and circle the correct answer below.*

The Taylor series for $\ln x$, centered at $x = 1$, is $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{(x-1)^n}{n}$. Let f be the function given by the sum of the first three nonzero terms of this series. The maximum value of $|\ln x - f(x)|$ for $0.3 \le x \le 1.7$ is

(A) 0.030 (B) 0.039 (C) 0.145 (D) 0.153 (E) 0.529

7. (CALC 26.0) Yes, this may be used for your FRQ folder!

2012 AP® CALCULUS BC FREE-RESPONSE QUESTIONS

x	1	1.1	1.2	1.3	1.4
$f'(x)$	8	10	12	13	14.5

4. The function f is twice differentiable for $x > 0$ with $f(1) = 15$ and $f''(1) = 20$. Values of f', the derivative of f, are given for selected values of x in the table above.

(d) Write the second-degree Taylor polynomial for f about $x = 1$. Use the Taylor polynomial to approximate $f(1.4)$.