



No calculators.

No pens: -10 pts.

No questions regarding content: -10 pts.

No late exams accepted. -100 pts.

No smart phones anywhere: -100 pts.

1. Test the series for convergence or divergence. Name the test utilized. Support your conclusion. If convergent, find the sum whenever possible.

$$\sum_{n=0}^{\infty} \frac{2n}{n^2 + 1}$$

Test:

Apply test / reasoning:

Converge / diverge:

Sum, if possible:

2. Find the center, radius, and the (open) interval of convergence for the power series. You need **NOT** test endpoints.

$$f(x) = \sum_{n=1}^{\infty} \frac{(-1)^n x^n}{(n-1)!}$$

Center: $C =$ Radius: $R =$ 

(open) Interval of Convergence (\quad , \quad)

3. Find the center, radius , and the (open) interval of convergence for the power series,

$$f(x) = \sum_{n=1}^{\infty} \frac{(-1)^n (x-2)^n}{5^n \cdot n^2} . \text{ You need } \underline{\text{NOT}} \text{ test endpoints.}$$

Center: $C =$

Radius: $R =$



(open) Interval of Convergence $\left(\quad , \quad \right)$



4. Given the power series, $f(x) = \sum_{n=1}^{\infty} \frac{(-1)^{n+1} (x-1)^n}{n}$, and the fact that the radius of convergence is $R = 1$, to find the interval of convergence, including testing endpoints, if necessary.

TEST LEFT ENDPOINT:

TEST RIGHT ENDPOINT:

FINAL interval of Convergence Radius:
(after testing endpoints)



5. For the power series, $f(x) = \sum_{n=0}^{\infty} \frac{(-1)^n (x-2)^n}{n!}$ find **AND** simplify or rewrite n^{th} term for each of the following. You need **NOT** find interval of convergence, nor test endpoints.

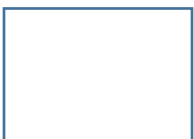
$$f(x) = \sum_{n=0}^{\infty} \frac{(-1)^n (x-2)^n}{n!} = 1 - \frac{1}{1!}(x-2) + \frac{1}{2!}(x-2)^2 - \frac{1}{3!}(x-2)^3 + \frac{1}{4!}(x-2)^4 - \frac{1}{5!}(x-2)^5 + \dots$$

a. $f'(x) = \sum_{n=}$



$$f(x) = \sum_{n=0}^{\infty} \frac{(-1)^n (x-2)^n}{n!} = 1 - \frac{1}{1!}(x-2) + \frac{1}{2!}(x-2)^2 - \frac{1}{3!}(x-2)^3 + \frac{1}{4!}(x-2)^4 - \frac{1}{5!}(x-2)^5 + \dots$$

b. $\int f(x) dx = C + \sum_{n=}$



6. Use the definition of the Taylor/Maclaurin Polynomial and Taylor/Maclaurin Series to find the 4th Maclaurin Polynomial for $f(x) = e^{-2x}$ centered at $c = 0$. Then use your polynomial to write the Maclaurin Series for $f(x) = e^{-2x}$ centered at $c = 0$.

$n = 0$			
$n = 1$			
$n = 2$			
$n = 3$			
$n = 4$			

4th Maclaurin polynomial: $P_4(x) =$

Maclaurin Series : $P(x) = \sum_{n=}$

7. (4 points): In your opinion the greatest song (or recording) of all time (in any musical genre).

There is no wrong answer.

