Math 141
Exam 3
#1-6:16 pts each. #7: 4 pts.

show all relevant work for full credit

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 **<u>center</u>**, **<u>radius</u>** , and the (open) **<u>interval of convergence</u>** for the power series,

$$f(x)=\sum_{n=1}^{\infty}\frac{(-1)^n(x-2)^n}{5^n\cdot n^2}$$. You need ***<u>NOT</u>*** 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, ***<u>including</u>*** 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.

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

a. $f^{/}(x)=\sum_{n=}^{\infty}$

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

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

6. Use the definition of the Taylor/Maclaurin Polynomial and Taylor/Maclaurin Series to find the **4**th 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 $c = 0$.

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

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

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

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

There is no wrong answer.