MTH 1126 Practice Test #5

FALL 2015

Pat Rossi Name _____

Instructions. In exercises 1 - 9 determine whether the given series converges or diverges.

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

2. $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{(2n)!}$

3. $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+1}{n+4}$

4. $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{\ln(n+2)}$

5. $\sum_{n=1}^{\infty} \frac{n!}{(2n)!}$

6. $\sum_{n=1}^{\infty} (-1)^{n} \frac{(2n-1)!}{e^n}$

7. $\sum_{n=1}^{\infty} n^2 \left(\frac{3}{7}\right)^n$

8. $\sum_{n=1}^{\infty} \left(\frac{1}{2} + \frac{1}{n}\right)^n$

9. $\sum_{n=1}^{\infty} n^n \left(\frac{3}{5}\right)^n$

In exercises 10 - 12, determine whether the given series is divergent, conditionally convergent, or absolutely convergent.

10. $\sum_{n=1}^{\infty} (-1)^{n} \frac{2^n}{n!}$

11. $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{\ln(n+1)}$

12. $\sum_{n=1}^{\infty} (-1)^{n} \frac{n!}{(2n)!}$

In problems 13 - 15 simplify (identify) the given expression.

13. $\sum_{n=0}^{\infty} \frac{x^n}{n!} = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \ldots$

14. $\sum_{n=0}^{\infty} (-1)^{n} \frac{x^{2n+1}}{(2n+1)!} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \ldots$

15. $\sum_{n=0}^{\infty} (-1)^{n} \frac{x^{2n}}{(2n)!} = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots$

16. Find the Taylor Series for $f(x) = \sin(x)$ centered at $c = \frac{\pi}{4}$.

17. Find the Taylor Series for $f(x) = \frac{1}{x}$ centered at $c = 2$

18. Find the Taylor Series for $f(x) = \ln(1 + x)$ centered at $c = 0$.

In problems 19 - 20 use a known Taylor Series expansion to derive an expansion for the given function.

19. $f(x) = \frac{1-\cos(x)}{x}$; $x \neq 0$.

20. $f(x) = \cos\left(x^2\right)$