MTH 174, Quiz #15, Spring 2018 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Determine the interval(s) for x for which the series converges. State the radius of convergence. Be sure to check the endpoints.

a. $\sum_{n=0}^{\infty}\left(\frac{x-3}{5}\right)^n$

$\left|\frac{x-3}{5}\right| < 1$

Radius of convergence = 5

Interval of convergence $(-2, 8)$

$-1 < \frac{x-3}{5} < 1$

$-5 < x-3 < 5$
$+3 \qquad +3$

@-2 $\left(\frac{-5}{5}\right)^n = (-1)^n$ diverges

@8 $\left(\frac{5}{5}\right)^n = 1^n$ diverges.

b. $\sum_{n=0}^{\infty}\frac{(x+1)^n}{n!}$

$\lim_{n\to\infty}\left|\frac{(x+1)^{n+1}}{(n+1)!}\cdot\frac{n!}{(x+1)^n}\right| = \lim_{n\to\infty}\frac{x+1}{n+1} = 0$

$R = \infty$

Interval $(-\infty, \infty)$

2. Determine the convergence or divergence of the series. State the test that was used.

a. $\sum_{n=1}^{\infty}\frac{3}{n(n+3)}$ Converges use direct comparison or telescoping or limit comparis on $\frac{1}{n^2}$

b. $\sum_{n=0}^{\infty}\left(\frac{\pi}{e}\right)^n$ diverges geometric $\frac{\pi}{e} > 1$

c. $\sum_{n=1}^{\infty} \frac{\sqrt{n-5}}{n^2+1}$ Converges direct comparison or limit comparison w/ $\frac{1}{n^{3/2}}$

d. $\sum_{n=1}^{\infty} \frac{2+\sin n}{n}$ diverges limit comparison w/ squeeze theorem

e. $\sum_{n=0}^{\infty} \frac{\cos n\pi}{n+1}$ $= \sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{n+1}$ Converges alternating series