Name: ______________________________ Quiz 7

Math F252X-901, Calculus II Fall 2024

Thirty minutes maximum. No aids (book, notes, calculator, phone, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably simplified form.

1. (5 points.) Write out the first 5 terms of the sequence of partial sums for the series $\sum_{n=0}^{\infty}(2n+1)$.

   $S_1 = \sum_{n=0}^{0}(2n+1) = 2(0)+1 = 1$

   $S_2 = S_1 + 2(1)+1 = 4$

   $S_3 = S_2 + 2(2)+1 = 9$

   $S_4 = S_3 + 2(3)+1 = 16$

   $S_5 = S_4 + 2(4)+1 = 25$

2. Determine whether the following series converge or diverge. If the series converges, state its sum. Justify your answers.

   (a) (6 points.) $\sum_{n=1}^{\infty} \frac{1}{3000}\left(\frac{7}{5}\right)^n$.

   Geometric series,
   $|r| = \left|\frac{7}{5}\right| > 1$
   Therefore diverges
   (divergence test works too)

   (b) (6 points.) $\sum_{n=1}^{\infty} 10\left(-\frac{3}{5}\right)^n$.

   Geometric series
   $|r| = \left|-\frac{3}{5}\right| < 1$, therefore converges

$\sum_{n=1}^{\infty} 10\left(-\frac{3}{5}\right)^n = \sum_{n=0}^{\infty} 10\left(-\frac{3}{5}\right) - 10$

$= \frac{10}{1-\left(-3/5\right)} - 10 = -\frac{15}{4}$

3. What does the divergence test say about the following series? Justify your answers.

(a) (6 points.) $\sum_{n=1}^{\infty} \left(\frac{n}{40n^2+30} \right)$.

$$\lim_{n \to \infty} \frac{n}{40n^2+30} = 0$$ (there are many ways to show this)

Divergence test is inconclusive

(b) (6 points.) $\sum_{n=1}^{\infty} 9^{(n^{-2})}$.

$$\lim_{n \to \infty} 9^{n^{-2}} = 1 \neq 0$$

So the series diverges by the divergence test.