Math 252: Quiz 8 **5 November, 2026**

Name: _____ **/ 25**

30 minutes maximum. No aids (book, calculator, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form. 25 points possible.

1. Determine whether the following series converge or diverge.

   (a) (5 points) $\displaystyle\sum_{n=1}^{\infty} \left(\frac{1}{e}+\frac{1}{n}\right)^n$

   (b) (5 points) $\displaystyle\sum_{n=100}^{\infty} \frac{(n!)^2}{(3n)!}$

2. Consider the power series $\sum_{n=0}^{\infty} \frac{(3x)^n}{2^n}$.

   (a) (5 points) Determine the radius of convergence of the power series.

   (b) (5 points) Determine the interval of convergence of the power series.

3. (5 points) Use the fact that $\dfrac{1}{1-x} = \displaystyle\sum_{n=0}^{\infty} x^n$ with interval of convergence $(-1,1)$ to find a power series representation for $\dfrac{3}{1+5x}$.

4. (BONUS) (2 points) What is the center of the power series $\displaystyle\sum_{n=0}^{\infty} \frac{3(x+5)^n}{4(n+1)}$? (This is not meant to be a challenging problem.)