Name:

Convergence Test Quiz 1

Instructions: Show all of your work. Be sure you clearly state conditions for tests you apply. You cannot apply a test without showing its conditions are met (if that test has conditions that need to be shown).

1. Answer the question below. Identify the test you used and explain why you used that test.

To what number does the series $\sum_{k=0}^{\infty} \left(\dfrac{-e}{\pi}\right)^k$ converge?

2. Which of the following series converge? Identify the tests you used and all show all your steps for applying those tests.

I. $\sum_{n=1}^{\infty} \dfrac{1}{\sqrt{n}}$

II. $\sum_{n=1}^{\infty} \dfrac{3^n}{n!}$

III. $\sum_{n=1}^{\infty} \left(\dfrac{e}{\pi}\right)^n$

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3. Determine for each series below if the alternating series test can be applied to show convergence. Explain your reasoning for why or why not the alternating series test can be applied.

I. $4 - \frac{1}{9} + 1 - \frac{1}{81} + \frac{1}{4} - \frac{1}{729} + \frac{1}{16} - \cdots + a_n + \cdots$, $where\ a_n = \begin{cases} -\frac{1}{3^n} & if\ n\ is\ even \\ \frac{8}{2^n} & if\ n\ is\ odd \end{cases}$

II. $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - \frac{1}{8} + \cdots + a_n + \cdots$, $where\ a_n = \frac{(-1)^{n+1}}{n}$

III. $\frac{2}{3} - \frac{3}{5} + \frac{4}{7} - \frac{5}{9} + \frac{6}{11} - \frac{7}{13} + \frac{8}{15} - \cdots + a_n + \cdots$, $where\ a_n = (-1)^{n+1}\frac{n+1}{2n+1}$

4. Use the ratio test to show that the series $\sum_{n=0}^{\infty} \frac{e^n x^n}{n!}$ converges for all real x-values.