**Math 252: Quiz 7** **26 Oct 2023**

**Name:** ______________________________ ________ / 25

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

**1.** **[8 points]** For each series below (i) write the series using $\sum$ notation, (ii) determine whether the series converges, (iii) explain your reasoning, (iv) if the series converges, determine its sum.

**a**. $2+\dfrac{2}{\pi}+\dfrac{2}{\pi^2}+\dfrac{2}{\pi^3}+\dfrac{2}{\pi^4}+\cdots$

**b**. $-\dfrac{4}{3}+\dfrac{16}{9}-\dfrac{64}{27}+\dfrac{256}{81}-\cdots$

**2. [3 points]** Given the series $\displaystyle\sum_{n=1}^{\infty}\left(\frac{3}{n+3}-\frac{3}{n+4}\right)$.

**a**. Find $S_k$, the $k$th partial sum of the series.

**b**. Use $S_k$ to determine the value of series or explain why the series diverges.

**3. [4 points]** Use the Integral Test to determine whether the series $\sum_{n=1}^{\infty} ne^{-n^2}$ converges or diverges.

**4. [2 points]** State what is meant by the **harmonic series** and whether the series converges or diverges.

**5. [8 points]** Determine whether the series below converge or diverge. Explain your reasoning.

**a.** $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n^4}}$

**b.** $\displaystyle\sum_{n=1}^{\infty} \frac{n}{\ln(n)}$