The University of Calgary
Department of Mathematics and Statistics
MATH 349 -01/02
Quiz # 2R

Fall,2007

Name:_____**I.D.#:**_____

1. Find the sum of the series $\displaystyle\sum_{n=1}^{\infty}\frac{(-1)^n\,\pi^{n+2}}{4^{2n}}=\pi^2\sum_{n=1}^{\infty}\left(\frac{-\pi}{16}\right)^n=\pi^2\cdot\frac{\left(\frac{-\pi}{16}\right)}{1+\frac{\pi}{16}}=\frac{-\pi^3}{16+\pi}$

   using $\displaystyle\sum_{n=N}^{\infty}r^n=\frac{r^N}{1-r}$ for $-1<r<1$.

2. Is the series $\displaystyle\sum_{n=2}^{\infty}\frac{1}{n\sqrt{\ln n}}$.convergent or divergent?Explain.

   By Integral Test:: $f(x)=\dfrac{1}{x\sqrt{\ln x}}$ is cont. positive and decr $(=\frac{1}{incr})$ for $x\geq 2$

   $\displaystyle\int_2^{\infty}\frac{dx}{x\sqrt{\ln x}}=\left(\text{subst.}u=\ln x, du=\frac{dx}{x}\right)=\int_{\ln 2}^{\infty}\frac{du}{\sqrt{\ln u}}=\left[2\sqrt{\ln u}\right]_{\ln 2}^{\infty}=\infty$

   the integral is divergent so is the series.

3. Is the series $\displaystyle\sum_{n=2}^{\infty}\cos\left(\tfrac{1}{n}\right)$.convergent or divergent?Explain.

   The series is divergent. since $\lim\limits_{n\to\infty}\cos\frac{1}{n}=\cos 0=1\neq 0$ necessary condition