

SAMPLE TEST # 4

Solve the exercises. **Show your work.**

**Ex. 1.** Determine whether or not the **sequence**  $\{a_n\}$  converges, and find its limit, if it does converge.

(a)  $a_n = \frac{\sin n}{\ln n}$

(b)  $a_n = \frac{(\ln n)^2}{n}$

**Ex. 2.** Determine whether the given infinite **series** converges or diverges. If it converges, find its sum.

(a)  $\sum_{n=1}^{\infty} \frac{1}{n^{1/n}}$

(b)  $\sum_{n=1}^{\infty} \frac{\cos \pi n}{\pi^n}$

**Ex. 3.** Determine whether the given infinite series converges or diverges. Indicate which test you use.

(a)  $\sum_{n=1}^{\infty} \frac{\arctan n}{n}$

(b)  $\sum_{n=1}^{\infty} \frac{\ln n}{e^n}$

(c)  $\sum_{n=1}^{\infty} \left(\frac{1}{n^2}\right)^n$

(d)  $\sum_{n=1}^{\infty} \frac{n!n^3}{(2n)!}$

(e)  $\sum_{n=2}^{\infty} \frac{\cos \pi n}{\ln n}$

**Ex. 4.** Find the radius of convergence and the interval of convergence of the power series:

$$\sum_{n=0}^{\infty} \frac{(-3)^n x^n}{\sqrt{n+1}}$$