

PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

Exam 1

Mathematics for Computing

12–11–2008

1. (a) Evaluate the limit of this sequence.

$$\frac{\ln 2}{\sqrt{2}}, \frac{\ln 3}{\sqrt{3}}, \frac{\ln 4}{\sqrt{4}}, \frac{\ln 5}{\sqrt{5}}, \dots$$

- (b) Evaluate the sum of this geometric series.

$$4 + 3 + \frac{9}{4} + \frac{27}{16} + \frac{81}{64} + \dots$$

2. Use the integral test to determine convergent or divergent.

$$\sum_{n=1}^{\infty} \frac{\ln n}{n}$$

3. Find the interval of convergence for the given power series.

$$\sum_{n=1}^{\infty} \frac{(-5)^n}{n^2} x^n$$

4. Use the Taylor series formula to find the Taylor series representation for

$$f(x) = \frac{1}{(1-x)^2}$$

centered at $x = 0$. (DON'T find the interval of convergence.)

5. Use the Taylor series representation for $\cos x$ to approximate the value of the following definite integral using power series.

$$\int_0^1 \frac{1 - \cos x}{x^2}$$