

MATH 2460 EXAM 4

NAME _____ GRADE _____ OUT OF 15 PTS

Answer the following questions correctly (*no decimal answer, except in 1(b)*) for a full credit.

1. (2pts) Given the term of the series $\frac{\ln 2}{2} + \frac{\ln 3}{3} + \frac{\ln 4}{4} + \dots +$, answer the following:

(a) Write the n^{th} term or the general expression of the series.

(b) Find the first *three* terms of the sequence of partial sums. (Round your answers to *four decimal places*.)

2. (1pt) Find the *sum* of the convergent series: $\sum_{n=0}^{\infty} 7\left(\frac{3}{4}\right)^n$

3. (3pts) Which, if any, of the following series are telescoping, geometric, p -series, harmonic, alternating or other.

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

(b) $\sum_{n=1}^{\infty} \frac{1}{n^2}$

(c) $\sum_{n=0}^{\infty} \frac{\pi}{2^n}$

(d) $\sum_{n=0}^{\infty} (-1)^n \frac{5^n}{n!}$

(e) $\sum_{n=1}^{\infty} \frac{\sin n}{n^2}$

(f) $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$

(g) $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$

Write down the corresponding letter(s), if any, for the series here:

Telescoping _____ Geometric _____ p -series _____

Harmonic _____ Alternating _____ Others _____

4. (2pts) A ball is dropped from a height of **9** feet. Each time it drops, it rebounds and its new height is **3/4** of its previous height. Find the *total vertical distance* traveled by the ball until it stops.

5. (1pt) Does the integral $\int_0^{\infty} e^{-x} dx$ converge? *Justify* your answer after evaluating it. (show work for a full credit!)

6. (3pts) Which, if any, of the following series diverge, converge, converge absolutely, converge conditionally. Justify your answer by showing your work (*after stating the test used!*).

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

(b)
$$\sum_{n=1}^{\infty} \frac{\cos(n\pi)}{n^2}$$

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

(d)
$$\sum_{n=0}^{\infty} \frac{5^n}{n!}$$

7. (1.5pts) Find a Maclaurin series for $h(x) = \sin(x)$ (**show** your work!).

8. (1.5pts) **Choose ONE** of the following questions:(Either (a) OR (b) and clearly **show** your work!)

(a) Find the Maclaurin polynomial of order 4 for the function $f(x) = x^4 - 2x^3 + 4x^2 - 2x + 1$.

(b) Find the Maclaurin polynomial of order 4 for the function $f(x) = x^4 - 5x^3 - 2x^2 + 3x - 1$.