

MTH112 – TEST 4

Name: \_\_\_\_\_

HONOR CODE: On my honor, I have neither given nor received any aid on this examination.

Signature: \_\_\_\_\_

Note: Show all work on exam in order to receive full credit.

1. Determine whether the sequence converges or diverges. If it converges, find the limit.

(a)  $\frac{4n - 3}{3n + 4}$

(b)  $\ln(n + 1) - \ln n$

(c)  $\frac{(-3)^n}{n!}$

2. Determine whether the series is convergent or divergent. If it is convergent, find its sum.

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

(b)  $\sum_{n=1}^{\infty} \frac{n^2}{3(n+1)(n+2)}$

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

3. Determine whether each integral is convergent or divergent. Evaluate those that are convergent.

$$(a) \int_0^{\infty} \frac{x}{(x+2)(x+3)} dx$$

$$(b) \int_{-\infty}^{\infty} e^{-|x|} dx$$

$$(c) \int_0^2 \frac{1}{4x-5} dx$$

4. Use comparison tests to determine whether the series is convergent or divergent.  
*Do not* evaluate the convergent sums.

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

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

(c) 
$$\sum_{n=1}^{\infty} \frac{3n^3 - 2n^2}{n^4 + n^2 + 1}$$