

St. Ambrose University  
Department of Mathematics  
Math. 192                  Exam 2

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

ID.#: \_\_\_\_\_

**Solve each of the following problems SHOWING ALL DETAILS  
. Unsupported or unclear answers will not receive partial credit. (12 pts each )**

1) Evaluate  $\int \frac{\sqrt{x^2 - 3}}{x} dx$

2) Evaluate  $\int \frac{dx}{x^2 + x}$

a) Define what is a sequence.

b) Determine if the sequence  $\left\{ \frac{n}{\ln n} \right\}_{n=1}^{\infty}$  converges. If so, find the limit.

3) Find the general term of the sequence starting with  $n = 1$ . Determine if the sequence converges, and if so find its limit.

$$(\sqrt{2} - \sqrt{3}), (\sqrt{3} - \sqrt{4}), (\sqrt{4} - \sqrt{5}), \dots$$

4)

a) Define what it means for an infinite series to converge

b) Define what is a geometric series and when it converges.

c) Determine if the following series converges and if so find its sum.

i) 
$$\sum_{k=0}^{\infty} \left(\frac{2}{3}\right)^k$$

ii) 
$$\sum_{k=1}^{\infty} \frac{1}{k(k+1)}$$

5) Express the decimal  $4.\overline{36}$  as a fraction using geometric series.

6) Evaluate  $\int_1^{\infty} \frac{dx}{x}$