

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

Section: \_\_\_\_\_

**MA 114 QUIZ #1**  
September 4, 2014

The following quiz is worth 4 points. Each problem will be worth 2 points. Be sure to read the problem carefully and answer every part of the problem. Be sure to show all of your work. Answers without support will not receive any credit.

1. Determine whether or not the following integral converges or diverges. If it converges, determine the value of the integral.

$$\int_0^2 \frac{2}{x^3} dx$$

The above integral is improper, given that  $\frac{2}{x^3}$  is not defined at  $x = 0$ . We have

$$\begin{aligned} \int_0^2 \frac{2}{x^3} dx &= \lim_{R \rightarrow 0^+} \int_R^2 \frac{2}{x^3} dx \\ &= \lim_{R \rightarrow 0^+} \left( \frac{-1}{x^2} \Big|_R^2 \right) \\ &= -\frac{1}{4} + \lim_{R \rightarrow 0^+} \frac{1}{R^2} \\ &= \infty \end{aligned}$$

The integral diverges.

1 point for correctly rewriting the integral with the correct limits and bounds, and 1 point for drawing the correct conclusion concerning the divergence of the integral.

2. Find an  $n$ th term rule for the sequence  $\left\{ \frac{1}{2}, -\frac{1}{4}, \frac{1}{6}, -\frac{1}{8}, \dots \right\}$ . If the sequence converges, determine the limit of the sequence.

We have  $\left\{ \frac{(-1)^{n+1}}{2n} \right\}_{n=1}^{\infty} = \left\{ \frac{1}{2}, -\frac{1}{4}, \frac{1}{6}, -\frac{1}{8}, \dots \right\}$ . We have  $\lim_{n \rightarrow \infty} \frac{(-1)^{n+1}}{2n} = 0$ .

1 point for correctly determining an  $n$ th term rule for the sequence (make sure to pay attention to where the index starts). 1 point for correctly determining the limit of the sequence.