Name: ______________________________ Section: ________________

MA 114 QUIZ #2
September 9, 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. Use the formula for the sum of a geometric series to find the sum or state that the series diverges and why.

$$\sum_{n=0}^{\infty} \frac{5^{n-1}}{(-6)^n}$$

We have $\displaystyle\sum_{n=0}^{\infty} \frac{5^{n-1}}{(-6)^n} = \sum_{n=0}^{\infty} \left(\frac{5}{-6}\right)^n \left(\frac{1}{5}\right)$, and so because $|r| = |\frac{-5}{6}| < 1$, the series converges to $\frac{1/5}{1-(-5/6)} = \frac{6}{55} = 0.1091$.

1 point for simplifying the series correctly, 1 point for drawing the correct conclusion with the correct sum.

2. Use the Integral Test to determine if the following series converges or diverges.

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

Note that we may apply the integral test because $f(x) = \frac{x^2}{(x^3+2)^2}$ is positive, decreasing, and continuous for $x \geq 1$. Taking $u = x^3 + 2, du = 3x^2 dx$, we have

$$\int_1^{\infty} \frac{x^2}{(x^3+2)^2} dx = \int \frac{du}{3u^2} = \lim_{R\to\infty} \frac{-1}{3(x^3+2)}\Big|_1^R = \lim_{R\to\infty} \frac{-1}{3(R^3+2)} - \frac{-1}{3(1^3+2)} = 0 + \frac{1}{6},$$

thus the series converges.

1 point for correctly solving the integral, 1 point for drawing the correct conclusion about the series.