Math 222 Quiz 4

September 30, 2010

Your Name: *Your Section:*

Instructions: Time is 20 minutes and the total score is 10 points. You can answer in attached papers if you like. There is one extra problem on the back.

1. Choose **ANY ONE** of the two below.(3 points)
   - If $\int_1^{+\infty} \frac{1}{x^2} dx$ means $\lim\limits_{b\to+\infty} \int_1^b \frac{1}{x^2} dx$, what does $\int_0^{+\infty} \frac{1}{x^2} dx$ mean? Does it converge? Why?
   - Find the error below and give out the correct answer:
   $\int_{-1}^1 \frac{1}{x^{4/3}} dx = (-3x^{-1/3})|_{-1}^1 = -3 + 3(-1)^{-1/3} = -6.$

2. Calculation. (7 points)

   (a). $\int_0^\infty y e^{-y} dy$ (3 pts)

   (b) i). Given $2, 7, 12, 17, 22, \ldots$ where each number except the first one minus its previous one is a constant, find the expression for the n-th term a_n. (2 pts)

   ii). Find the limit $\lim\limits_{n\to\infty} \frac{a_n}{\sqrt{n^2+1}}$ (2 pts)

(Bonus) 2pts.

If $a_1 = 1$ and $a_{n+1} = a_n/(n+1)$, find $\lim\limits_{n \to \infty} 2^n a_n$