PRINT Your Name:_____

Quiz – November 9, 2004

Consider the series $\displaystyle\sum_{n=1}^{\infty}(-1)^{n+1}\frac{2}{3n+1}$. SHOW that the Alternating Series Test applies to this series. ESTIMATE the error that is made when the ninth partial sum $\displaystyle s_9 = \sum_{n=1}^{9}(-1)^{n+1}\frac{2}{3n+1}$ is used as an approximation for the sum of the entire infinite series.

Answer: The series alternates. The absolute value of the terms $\{\frac{2}{3n+1}\}$ decrease as n increases, with limit zero. The Alternating Series Test applies. We conclude that the series converges and that the distance between the sum of the entire series and the ninth partial sum is less than or equal to the next term; that is,

$$\left|\sum_{n=1}^{\infty}(-1)^{n+1}\frac{2}{3n+1} - \sum_{n=1}^{9}(-1)^{n+1}\frac{2}{3n+1}\right| \leq \frac{2}{31}.$$