Math 136: Calculus 2
Spring 2017
Professor Levandosky
Written Homework 8

1. Evaluate the following limits.

   (a) $\displaystyle\lim_{n\to\infty} \frac{2n+5}{5n-7}$

   (b) $\displaystyle\lim_{n\to\infty} \frac{n^2}{n+3}$

   (c) $\displaystyle\lim_{n\to\infty} \frac{n^2+1}{5n^3+2n+6}$

   (d) $\displaystyle\lim_{n\to\infty} \frac{2n}{e^n}$

   (e) $\displaystyle\lim_{n\to\infty} \sqrt{n+5} - \sqrt{n}$

   (f) $\displaystyle\lim_{n\to\infty} n - \sqrt{4n^2-3}$

   (g) $\displaystyle\lim_{n\to\infty} \frac{(-1)^n n}{n^2+3}$

   (h) $\displaystyle\lim_{n\to\infty} \frac{(-1)^n n^2}{n^2+3}$

2. Evaluate the following limits of recursively defined sequences.

   (a) $\displaystyle\lim_{n\to\infty} a_n$, where $a_1 = 2$ and $a_n = \frac{3}{4}a_{n-1} + 7$ for $n > 1$.

   (b) $\displaystyle\lim_{n\to\infty} b_n$, where $b_1 = 2$ and $b_n = \frac{3}{2}b_{n-1} + 1$ for $n > 1$.

3. For each series, either find its sum if it converges, or explain why it diverges.

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{2n}{3n+5}$

   (b) $\displaystyle\sum_{n=0}^{\infty} \frac{6+5^n}{7^n}$

   (c) $\displaystyle\sum_{n=0}^{\infty} \frac{3(2^n)}{5^n}$

   (d) $\displaystyle\sum_{n=0}^{\infty} 7(\pi/e)^n$

   (e) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}} - \frac{1}{\sqrt{n+2}}$

4. Use the integral test to determine whether each series converges or diverges.

   (a) $\displaystyle\sum_{n=2}^{\infty} \frac{1}{n(\ln(n))^2}$

   (b) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{n^2+8}$

   (c) $\displaystyle\sum_{n=1}^{\infty} \frac{n}{e^n}$

5. Use the comparison test to determine whether each series converges or diverges.

   (a) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{(n^2+4)^2}$

   (b) $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{2n^2+1}}$