

**Math 131A, problem set 07**  
**Outline due: Fri Oct 17**  
**Completed version due: Mon Oct 27**  
**Last revision due: Wed Nov 19**

All problem numbers refer to Bartle and Sherbert.

**Problems to be done but not turned in:** (3.7) 1, 3, 6, 7, 9, 11, 12, 14, 15.

**Problems to be turned in:**

1. Determine if the series  $\sum_{n=1}^{\infty} \frac{(\sin n)^2 1000^n}{n!}$  converges or diverges, and prove your answer.
2. Determine if the series  $\sum_{n=1}^{\infty} \frac{(n^3 + 2n^2 + 13)(1 - 2^{-n})}{15n^4 + n^2 + 1}$  converges or diverges, and prove your answer.
3. Determine if the series  $\sum_{n=1}^{\infty} (n^{1/n})4^{-n^2}$  converges or diverges, and prove your answer.
4. Determine if the series  $\sum_{n=1}^{\infty} \frac{(n!)^2}{(2n)!}$  converges or diverges, and prove your answer.
5. (3.7) 8.
6. (3.7) 10. (Suggestion: Use Comparison and use the fact that any square is always nonnegative.)
7. Let  $\sum x_n$  and  $\sum y_n$  be series, and suppose that for some  $K \in \mathbf{N}$ ,  $x_n = y_n$  for all  $n \geq K$ . Prove that  $\sum x_n$  converges if and only if  $\sum y_n$  converges.