ESP Math 182 **Spring 2015**

Worksheet 19

17 March 2015

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1. **Warm up:** Answer the following true / false questions. No reasons are necessary.

   (a) If $\sum_{n=1}^{\infty} |a_n|$ converges, then $\sum_{n=1}^{\infty} a_n$ converges.

   (b) The converse of the above statement.

   (c) If $\lim_{n\to\infty} [a_n] = 0$, then $\sum_{n=0}^{\infty} a_n$ converges.

   (d) The converse of the above statement.

2. Use the integral test to determine whether the infinite series converge or diverge.

   (a) $\sum_{n=1}^{\infty} n^{-1/3}$

   (b) $\sum_{n=1}^{\infty} ne^{-n^2}$

   (c) $\sum_{n=1}^{\infty} \frac{\ln(n)}{n^3}$

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

3. **Review**: Integrating powers of $\sec x$.

   (a) Compute $\int \sec x \, dx$ using the substitution $u = \sec x + \tan x$.

   (b) Compute $\int \sec^2 x \, dx$.

   (c) Compute $\int \sec^3 x \, dx$ using integration by parts with $u = \sec x$ and $v' = \sec^2 x \, dx$.

4. Why is $S = \sum_{n=1}^{\infty} \frac{n^2}{5^n}$ not a geometric series? Show that it is bounded by finding a geometric series larger than S. Do you now have enough information to say that S converges?