Math 31 – Workshop #25

1. Consider the series $\sum_{n=1}^{\infty} \frac{2^n x^n}{5^{n+1}}$.

   (a) Rewrite this series (in summation notation) so that it is clear that this is a geometric series.

   (b) What is the common ratio?

   (c) Use the information you found above to determine for which values of x this series will converge.

2. Consider the series $\sum_{n=1}^{\infty} \frac{nx^n}{\sqrt{n+1}}$.

   (a) Compute $\lim_{n\to\infty} \frac{a_{n+1}}{a_n}$.

   (b) From the information you found above, for what values of x do you know the series will converge?

   (c) For what values of x were you not able to determine convergence or divergence? Check those values.

3. The set of values of x for which a series converges is called the interval of convergence. Find the interval of convergence for each of the following series.

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

   (b) $\sum_{n=1}^{\infty} \frac{\sqrt{n}(x-3)^n}{4^n}$

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

   (d) $\sum_{n=1}^{\infty} \frac{x^n(n-1)!}{e^n}$