HW 17: Section 8.1 and 8.2

Due: Thursday, November 14th in SQRC by 9pm

Learning Goals:

- Determine if a sequence converges or diverges.
- Understand when geometric series converge and what they converge to.
- Determine if a series converges or diverges.

Questions:

1. Problem 8.1.16 Determine whether or not the sequence $a_n = (-1)^n \frac{n+4}{n+1}$ converges or diverges.

   Does not converge because it bounces back and forth between -1 and 1.

2. Problem 8.1.32 Determine whether or not the sequence $a_n = \frac{\cos(\pi n)}{n^2}$ converges or diverges. Justify your answer.

   Converges to zero because we can squeeze it in between $-1/n^2 \leq \cos(\pi n)/n^2 \leq 1/n^2$ and they both go to zero.

3. Problem 8.2.4 Determine whether the series $\sum_{k=0}^{\infty} 4\left(\frac{1}{2}\right)^k$ converges or diverges. If it converges, find the sum of the series.

   geometric series converges to $4 \cdot \frac{1}{1-1/2} = 8$

4. Problem 8.2.6 Determine whether the series $\sum_{k=3}^{\infty} (-1)^k \frac{3}{2^k}$ converges or diverges. If it converges, find the sum of the series. (be careful about the starting value for the sum!)

   Geometric series converges to $3 \cdot \frac{-1/8}{1--1/2} = -1/4$

5. Problem 8.2.12 Determine whether the series $\sum_{k=1}^{\infty} \frac{4}{k+1}$ converges or diverges. If it converges, find the sum of the series.

   diverges just like $1/k$ diverges

6. Problem 8.2.16 Determine whether the series $\sum_{k=1}^{\infty} 3^{1/k}$ converges or diverges. If it converges, find the sum of the series.

   diverges because $3^{1/k}$ approaches 1 as k approaches infinity.

7. Problem 8.2.26 Determine all value of c for which the series $\sum_{k=1}^{\infty} \frac{2}{(x-3)^k}$ converges.

   converges as a geometric series if $|x-3| < 1$ so $2 < x < 4$.

8. Problem 8.2.32 Use graphical or numerical evidence to conjecture the convergence of divergence of the series $\sum_{k=1}^{\infty} \frac{2^k}{k!}$.

   converges to e^2...lots of ways to answer this.