From Friday:

Do the following series converge or diverge?

1. $\displaystyle\sum_{k=1}^{\infty} \frac{2k^2 - 3}{5k^2 + 6k}$

   $\lim_{k\to\infty} a_k = \frac{2}{5}$. Thus the **sequence of terms** converges (to 2/5), but the **series** diverges by the nth term test. (In other words, the sequence of partial sums S_n diverges.)

2. $\displaystyle\sum_{k=98}^{\infty} \frac{3^k + \sin(k)}{\cos(k) + 5}$

   $\lim_{k\to\infty} a_k = \infty$. Thus the **sequence of terms** diverges, and thus by the nth term test, the series diverges also.

3. $\displaystyle\sum_{k=2}^{\infty} \frac{5^k - 6k - 27}{7^k + 14k^2 + k}$

Do the following series converge or diverge?

1. $\sum_{k=2}^{\infty} \frac{1}{k^2}$

   Hint: Draw a picture comparing with $\int_1^{\infty} \frac{1}{x^2}\, dx$.

2. $\sum_{k=1}^{\infty} \frac{1}{k}$

   Hint: Draw a picture comparing with $\int_1^{\infty} \frac{1}{x}\, dx$.

Goals: Be able to :

1. determine whether a series $\sum a_k$ converges or diverges.
2. If it converges, find the limit (that is, the value of the series) exactly, if possible.
3. If it converges but we can't find the limit exactly, be able to approximate it.