Math 250b (Kennedy) - Quiz 2 - Spring '08

1. For each of the following **sequences**, state whether it converges or diverges. If it converges, give its limit.

$$s_n = (0.99)^n$$

converges to 0 since $0.99 < 1$.

$$s_n = \frac{2n^2 - n + 7}{7 - n^2}$$

converges to $\frac{2}{-1} = -2$

$$s_n = \frac{\sin(n)}{n}$$

$\sin(n)$ is always betweeen -1 and 1 and $1/n$ converges to 0, so s_n converges to 0.

2. Find the sum of the following

$$1 - x^2 + x^4 - x^6 + x^8 - \cdots, \quad for \quad x^2 < 1$$

Its a geometric series and converges to

$$\frac{1}{1 - (-x^2)} = \frac{1}{1 + x^2}$$

$$\begin{aligned}
\sum_{n=4}^{20} \frac{1}{3^n} &= \frac{1}{3^4} \sum_{n=0}^{16} \frac{1}{3^n} = \frac{1}{3^4} \frac{1 - \frac{1}{3^{17}}}{1 - 1/3} \\
&= \frac{1}{3^4} \frac{3}{2} (1 - \frac{1}{3^{17}}) = \frac{1}{54} (1 - \frac{1}{3^{17}})
\end{aligned}$$