#2 Correction

$$\sum_{n=0}^{\infty}\left(\frac{1}{n+1}-\frac{1}{n+3}\right)$$

$$S_4=\left(1-\frac{1}{3}\right)+\left(\frac{1}{2}-\frac{1}{4}\right)+\left(\frac{1}{3}-\frac{1}{5}\right)+\left(\frac{1}{4}-\frac{1}{6}\right)+\left(\frac{1}{5}-\frac{1}{7}\right)$$

$$S_4=1+\frac{1}{2}-\frac{1}{6}-\frac{1}{7}$$

$$S_n=1+\frac{1}{2}-\frac{1}{n+2}-\frac{1}{n+3}$$

$$S=\lim_{n\to\infty}S_n=\lim_{n\to\infty}\left(1+\frac{1}{2}-\cancel{\frac{1}{n+2}}-\cancel{\frac{1}{n+3}}\right)$$

$$=3/2 \quad \text{converges}$$

#4 Correction

4. $\sum_{n=0}^{\infty} \frac{2n^2+1}{n^2+1}$

nth term test

$\lim_{n\to\infty} \frac{2n^2+1}{n^2+1} = 2 \neq 0$

series diverges

#11 Correction

11. $\sum_{n=1}^{\infty} \frac{1}{n^2+n}$

$\frac{1}{n(n+1)} = \frac{A}{n} + \frac{B}{n+1}$

$1 = A(n+1) + Bn$

let $n=-1$ let $n=0$

$1 = -B$ $1 = A$

$B = -1$

$\sum_{n=1}^{\infty} \left(\frac{1}{n} - \frac{1}{n+1}\right)$

$S_3 = \left(1-\frac{1}{2}\right) + \left(\frac{1}{2}-\frac{1}{3}\right) + \left(\frac{1}{3}-\frac{1}{4}\right)$

$S_3 = 1 - \frac{1}{4}$

$S_n = 1 - \frac{1}{n+1}$

$S = \lim_{n\to\infty} S_n = \lim_{n\to\infty}\left(1-\frac{1}{n+1}\right) = 1$ converges