HW §11.5 Numbers 6-16 even

6.
Since

$$\lim_{n\to\infty} \frac{1}{3n-1} = 0$$

and since

$$\frac{1}{3n-1}$$

is a decreasing sequence,

$$\sum_{n=1}^{\infty} \frac{-1^{n-1}}{3n-1}$$

converges by the alternating series test.

8
Since

$$\lim_{n\to\infty} \frac{2n}{4n^2+1} = 0$$

and since

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

is a decreasing sequence,

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

converges by the alternating series test.

10
Since

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

The series:

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

diverges by the test for divergence.

12
Since

$$\lim_{n\to\infty} \frac{e^{1/n}}{n} = 0$$

and since

$$\frac{e^{1/n}}{n}$$

is a decreasing sequence, ($e^{1/n}$ is getting smaller while n is getting larger)

$$\sum_{n=1}^{\infty} \frac{e^{1/n}}{n} = 0$$

converges by the alternating series test.

14
Since

$$\lim_{n\to\infty} \frac{\ln n}{n} = 0$$

and since

$$\frac{\ln n}{n}$$

is a decreasing sequence,

$$\sum_{n=1}^{\infty} \frac{\ln n}{n} = 0$$

converges by the alternating series test.

16
Since

$$\lim_{n\to\infty} \frac{\sin(n\pi/2)}{n!} = 0$$

and since

$$\frac{\sin(n\pi/2)}{n!}$$

is a decreasing sequence,

$$\sum_{n=1}^{\infty} \frac{\sin(n\pi/2)}{n!} = 0$$

converges by the alternating series test.