1.97

a)

$$c_n = \frac{1}{2 \cdot n} \quad | : n$$

$$c_n = \frac{\frac{1}{n}}{\frac{2 \cdot n}{n}} = \frac{0}{2} = 0$$

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

→ konvergent

b) $c_n = \frac{n-1}{n} = \frac{n}{n} - \frac{1}{n} = 1 - 0 = 1$

$$\lim_{n \to \infty} = 1$$

→ konvergent

c) $c_n = \frac{2n-1}{n} = \frac{2n}{n} - \frac{1}{n} = \frac{2n}{n} - 0$

$$\lim_{n \to \infty} = 2$$

→ konvergent

d) $c_n = \frac{1-3n}{n} = \frac{1}{n} - \frac{3n}{n} = -3$

$$\lim_{n \to \infty} = -3$$

→ konvergent

e) $c_n = \frac{1}{n^2} \quad | : n^2$

$$c_n = \frac{\frac{1}{n^2}}{\frac{n^2}{n^2}} = 0$$

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

→ konvergent

f) $c_n = 2 + \frac{1}{n^2} = 2$

$$\lim_{n \to \infty} = 2$$

→ konvergent

g) $c_n = \frac{1+2n^2}{3n^2} \quad | : n^2$

$$c_n = \frac{\frac{1+2n^2}{n^2}}{\frac{3n^2}{n^2}} = \frac{\frac{1}{n^2} + \frac{2n^2}{n^2}}{3} = \frac{2}{3}$$

$$\lim_{n \to \infty} = \frac{2}{3}$$

→ konvergent

h) $c_n = \left(\frac{1}{3}\right)^n = \frac{1^n}{3^n} = \frac{1}{3^n} = 0$

→ konvergent

$c_n = \left(\frac{1}{3}\right)^n = \frac{1^n}{3^n} = \frac{1}{3^n} = 0$ → konvergent

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

1.98

$c_n = \frac{2n}{n+1}$

$c_n - 2 = \frac{2n}{n+1} - 2 = \frac{2n - 2n - 2}{n+1} = \frac{-2}{n+1}$

$|c_n - 2| = \left|\frac{-2}{n+1}\right| = \frac{2}{n+1}$

$\frac{2}{n+1} < N$

↳ a) $\frac{2}{n+1} < 0{,}01 \quad | \cdot (n+1)$

$2 < 0{,}01(n+1) \quad | : \frac{1}{100}$

$200 < n+1 \quad | -1$

$n > 199$

→ ab $n = 200$ ist der Abstand kleiner als $0{,}01$.

b)

$2 < 0{,}001(n+1) \quad | : \frac{1}{1000}$

$2000 < n+1$

$n > 1999$

→ ab $n = 2000$ ist der Abstand kleiner als $0{,}001$.

c)

$20000 < n+1$

$n > 19999$

→ ab $n = 20000$ ist der Abstand kleiner als $0{,}0001$.

1.100 a) $c_n = 1 + \cos(n \cdot \pi)$

→ divergent

b) $c_n = \sin(n \cdot \pi)$

→ konvergent

c) $c_n = \sin\left(\frac{n \cdot \pi}{2}\right)$

d) $c_n = (-1)^n \frac{1}{2^n}$

$\Rightarrow$ divergent

c) $c_n = 3 + 2 \cdot (-1)^n$

$\Rightarrow$ divergent

f) $c_n = (-2)^n$

$\Rightarrow$ divergent

g) $c_n = \frac{1}{(-2)^n}$

$\Rightarrow$ divergent

h) $c_n = n \bmod 2$

$\Rightarrow$ konvergent