(c) $g(x) = \sqrt{1+\frac{1}{x}}$ $\to$ decreasing

$$g(2) \le g(x) \le g(1)$$

$$\sqrt{1.5} \le g(x) \le \sqrt{2} \quad \Rightarrow \quad 1 \le g(x) \le 2$$

$$g'(x) = \frac{1}{2}\left(1+\frac{1}{x}\right)^{-\frac{1}{2}}\left(-\frac{1}{x^2}\right)$$

$$|g'(x)| = \frac{1}{2}\,\frac{1}{x^2\sqrt{1+\frac{1}{x}}} = \frac{1}{2}\,\frac{1}{\sqrt{x^4+x^3}}$$

$g'(x)$ - decreasing on $[1,2]$

$$\Rightarrow \quad |g'(x)| \le \frac{1}{2\sqrt{2}}$$

Thus, the rate of convergence is $O\left(\left(\frac{1}{2\sqrt{2}}\right)^n\right)$.

(d) $g(x) = \frac{1}{x^2-1}$ - DNE at $x=1$.

(e) $g(x) = x - \frac{x^3-x-1}{3x^2-1}$

This is complicated to investigate now.
We will discuss this later.