(2) let $\lim_{n\to\infty} x_n = z$

Then $\lim_{n\to\infty} x_n = \lim_{n\to\infty} \left[\frac{1}{2}\left(x_{n-1} + \frac{y}{x_{n-1}}\right)\right]$

Become: $z = \frac{1}{2}\left[\lim_{n\to\infty} x_{n-1} + y \lim_{n\to\infty} \frac{1}{x_{n-1}}\right]$

$$z = \frac{1}{2}[z + y/z]$$
$$2z = z + y/z$$
$$z = y/z$$
$$z^2 = y$$
$$z = \sqrt{y}$$

$$\boxed{\therefore \lim_{x\to\infty} x_n = \sqrt{y}}$$

(3) Since $y \geq 1$, then $a_{n-1} > a_n > a_{n+1}$

so, the sequences is a monotonic decrease.

Because, $x_n = \frac{1}{2}\left(x_{n-1} + \frac{y}{x_{n-1}}\right)$

$a_n = \frac{1}{2}\left(a_{n-1} + \frac{y}{a_{n-1}}\right)$ $a_{n+1} = \frac{1}{2}\left(a_n + \frac{y}{a_n}\right)$

$$a_n \geq a_{n+1}$$

$$\frac{1}{2}\left(a_{n-1} + \frac{y}{a_{n-1}}\right) \geq \cancel{a}\frac{1}{2}\left(a_n + \frac{y}{a_n}\right)$$

Also Based on part 2, the sequence bounded at $\sqrt{y}$, it has a lower boundary.

So, If a sequence monotonic decrease, and has a lower boundary. It's limit exist.