

T1

$$f(1) = -1, f(2) = 1$$

$$f(1.5) = -0.25$$

$$f(1.75) = 0.3125$$

$$f(1.625) = 0.015625$$

$$f(1.5625) = -0.12109375$$

T3

$$(1) |\varphi'(1.5)| = \frac{2}{1.5^3} < 1 \text{ 收敛}$$

$$(2) |\varphi'(1.5)| = \frac{2 \times 1.5}{3 \cdot (1 + 1.5^2)^{\frac{2}{3}}} < 1 \text{ 收敛}$$

$$(3) |\varphi'(1.5)| = \frac{1}{2(x-1)^{3/2}} > 1 \text{ 发散}$$

$$1.465$$

T7

$$(1) x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)} = \frac{2x_k^3 + 1}{3x_k^2 - 3}$$

$$x_0 = 2, x_1 = 1.889, x_2 = 1.879$$

$$(2) x_{k+1} = x_k - \frac{f(x_k)}{f(x_k) - f(x_{k-1})} (x_k - x_{k-1})$$

$$1.8810939357907253$$

$$1.879528265458499$$

$$1.8793854227707918$$

$$(3) f(x_0) = -3, f(x_1) = 17, f(x_2) = 1$$

$$f[x_1, x_0] = 10, f[x_2, x_1] = 16, f[x_2, x_1, x_0] = 6$$

$$\omega = f[x_2, x_1] + f[x_2, x_1, x_0](x_2 - x_1) = 10$$

$$x_{k+1} = x_k - \frac{2f(x_k)}{\omega + \sqrt{\omega^2 - 4f(x_k)f[x_k, x_{k-1}, x_{k-2}]}}$$

T12

$$x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)} = \frac{2x_k^3 + a}{3x_k^2}$$

$$\varphi'(x) = \frac{2}{3} - \frac{2a}{3x^3}$$

$$\varphi'(x^*) = 0$$

$$\varphi''(x^*) \neq 0$$

T13

$$x_{k+1} = x_k - \frac{f(x_k)}{f'(x_k)} = x_k - \frac{(x_k^2 - a)/x_k^2}{2a/x_k^3} = \frac{3ax_k - x_k^3}{2a}$$

