18. 令 $f(x)=x^3-a$，则 $f'(x)=3x^2$，$x_{k+1}=x_k-\frac{x_k^3-a}{3x_k^2}=\frac{2}{3}x_k+\frac{a}{3x_k^2}$

令 $\varphi(x)=\frac{2}{3}x+\frac{a}{3x^2}$，则 $\varphi'(x)=\frac{2}{3}+\frac{a}{3}(-2)\frac{1}{x^3}$，则 $\varphi'(\sqrt[3]{a})=0$

故该迭代至少二阶局部收敛

19. 令 $f(x)=(x^3-a)^2$，则 $f'(x)=2(x^3-a)3x^2=6x^2(x^3-a)$

$x_{k+1}=x_k-\frac{f(x)}{f'(x)}=x_k-\frac{x_k^3-a}{6x_k^2}=\frac{5}{6}x_k+\frac{a}{6x_k^2}$

令 $\varphi(x)=\frac{5}{6}x+\frac{a}{6x^2}$，$\varphi'(x)=\frac{5}{6}+\frac{a}{6}(-2)\frac{1}{x^3}$，$\varphi'(\sqrt[3]{a})=\frac{1}{2}\neq 0$

故该迭代仅为线性收敛

20. 令 $f(x)=\frac{1}{x}-a$，$f'(x)=-\frac{1}{x^2}$，则 $\varphi(x)=x-\frac{f(x)}{f'(x)}=2x-ax^2$

21. 令 $f(x)=\frac{1}{x^2}-a$，$f'(x)=-2x^{-3}$，则 $x_{k+1}=x_k-\frac{f(x)}{f'(x)}$

$$=x_k-\frac{\frac{1}{x_k^2}-a}{-2x_k^{-3}}$$

$$=\frac{3}{2}x_k-\frac{a}{2}x_k^3$$