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$$
\begin{aligned}
& X_{0}=\text { initial guess } \\
& y=f\left(x_{0}\right)+f^{\prime}\left(x_{0}\right)\left(x_{1}-x_{0}\right) \\
& 0=f\left(x_{0}\right)+f^{\prime}\left(x_{0}\right)\left(x_{1}-x_{0}\right) \\
& x_{1}=x_{0}-\frac{f\left(x_{0}\right)}{f^{\prime}\left(x_{0}\right)} \\
& x_{2}=x_{1}-\frac{f\left(x_{1}\right)}{f^{\prime}\left(x_{1}\right)} \\
& X_{n+1}=X_{n}-\frac{f\left(x_{n}\right)}{f^{\prime}\left(x_{n}\right)} \\
& \begin{array}{ll}
\text { ex,5 } & f(x)=x^{5}-x+1 \\
f^{\prime}(x)=5 x^{4}-1
\end{array} \quad x_{0}=-1 \\
& \begin{array}{c|c}
x & Y \\
-2-29
\end{array} \quad X_{1}=-1-\frac{f(-1)}{f^{\prime}(-1)}=-1-\frac{(-1)^{5}-(-1)+1}{5(-1)^{4}-1}=-1-\frac{1}{4}=-\frac{5}{4}=x_{1} \\
& X_{2}=-\frac{5}{4}-\frac{\left(-\frac{5}{4}\right)^{5}-\left(-\frac{5}{4}\right)+1}{5\left(-\frac{5}{4}\right)^{4}-1} \approx-1.178459394
\end{aligned}
$$

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$$
\begin{aligned}
& \text { ex.6 } \sqrt[3]{7}=x \\
& f(x)=x^{3}-7 \\
& \begin{array}{l}
7=x^{3} \downarrow \\
0=x^{3}
\end{array} \\
& f^{\prime}(x)=3 x^{2} \\
& 0=x^{3}-7 \\
& x_{0}=2 \\
& X_{1}=2-\frac{f(2)}{f^{\prime}(2)} \\
& x_{1}= \\
& =2-\frac{2^{3}-7}{3(2)^{2}} \\
& \text { ex. } 7 \\
& f(x)=x^{3}-3 x^{2}+x-1 \\
& f^{\prime}(x)=3 x^{2}-6 x+1 \\
& x_{0}=1 \\
& x_{1}=0 \\
& x_{2}=1 \\
& x_{3}=0 \\
& \text { ex. } 8 f(x)=\frac{(x-1)^{2}}{x^{2}+1} \\
& f^{\prime}(x)=\frac{2(x-1)\left(x^{2}+1\right)-\left(x^{2}-2 x+1\right)}{\left(x^{2}+1\right)^{2}}(2 x) \\
& \left\lvert\, \begin{array}{l}
\text { a. } x_{0}=-2 \\
\text { b. } x_{0}=-1
\end{array}=\frac{2 x^{3}-2 x^{2}+2 x-2-2 x^{5}+4 x^{2}-2 x}{\left(x^{2}+1\right)^{2}}\right. \\
& f^{\prime}(x)=\frac{2 x^{2}-2}{\left(x^{2}+1\right)^{2}}
\end{aligned}
$$



