$$f(x) = x^{-1} - b$$ Given Function

$$f'(x) = -\frac{1}{x^2}$$ Derivative

$$x_{k+1} = x_k - \frac{f(x)}{f'(x)}$$ (Newtons Method)

$$x_{k+1} = x_k + \frac{\frac{1}{x} - b}{+\frac{1}{x^2}} \cdot \frac{-x^2}{-x^2}$$ Substitution

$$x_{k+1} = x_k + x_k - bx^2$$ Simplification

$$= 2x_k - bx^2$$

$$x_{k+1} = 2x_k - bx_k^2$$ Result

Newtons Iteration, without division