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Solution: Let x be ~~any~~ with

$$f(x) = \begin{cases} \frac{k}{x^4} & x > 1 \\ 0 & x \leq 1 \end{cases}$$

a)

we know that $\int f(x) dx = 1$

$$\int_1^{\infty} \frac{k}{x^4} dx = 1 \rightarrow k \left[\frac{-1}{3x^3} \right]_1^{\infty} = 1$$

$$\frac{k}{3} \left[-\frac{1}{\infty} + \frac{1}{1^3} \right] = 1$$

$$\frac{k}{3} (0 + 1) = 1$$

$$\boxed{k = 3}$$

b)

pdf of x , $F_x(x) = P(x \leq x)$

$$F_x(x) = \int_1^x \frac{3}{x^4} dx$$

$$= 3 \left[-\frac{1}{3x^3} \right]_1^x = \frac{3}{3} \left[-\frac{1}{x^3} + 1 \right]$$

$$\boxed{F_x(x) = 1 - \frac{1}{x^3}}$$