Given that $\int_4^8 \frac{1}{2x-4} dx = ln\sqrt{a}$, find the value of **a**

This is a standard integral…

$$\int \frac{1}{2x-4} dx = \frac{1}{2}\ln(2x-4) + C$$

or you might use integration by substitution…

$$\int_{x=4}^{x=8} \frac{1}{2x-4} dx$$

$u = 2x - 4$

$\frac{du}{dx} = 2$

$\frac{1}{2}du = dx$

Change the limits

$u = 2 \times 8 - 4 = 12$

$u = 2 \times 4 - 4 = 4$

$$= \int_{u=4}^{u=12} \frac{\frac{1}{2}}{u} du$$

$$= \left[\frac{1}{2}\ln|u| \right]_4^{12}$$

$$= \frac{1}{2}ln12 - \frac{1}{2}ln4$$

$$= \frac{1}{2}ln\left(\frac{12}{4}\right)$$

$$= \frac{1}{2}ln3$$

$a = 3$