$$f(x) = k\sqrt{x} - \ln x = 0$$

$$f'(x) = \frac{k}{2\sqrt{x}} - \frac{1}{x} = \frac{1}{2}kx^{-1/2} - x^{-1}$$

$$f''(x) = -\frac{1}{4}kx^{-3/2} + x^{-2}$$

$$= \frac{1}{x^2} - \frac{k}{4x^{3/2}} = 0$$