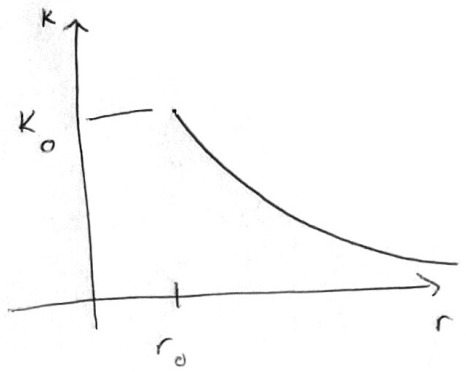
$$K = K(r) = K_0 e^{-\lambda(r-r_0)} \qquad (1)$$



For 2D

$dA = 2\tilde{\pi} r\, dr$

$= 2\tilde{\pi}\, r(K) \frac{\partial r}{\partial K} dK$ | $\int$

$$\Rightarrow \quad A(K) = 2\tilde{\pi} \int_{K_0}^{K} r(K) \frac{\partial r}{\partial K} dK \qquad (2)$$

$$\begin{cases} r(K) \overset{(1)}{=} r_0 - \frac{1}{\lambda} \ln \frac{K}{K_0} \\ \frac{\partial r(K)}{\partial K} = -\frac{1}{\lambda K} \end{cases}$$

$$\Rightarrow \quad A(K) = 2\tilde{\pi} \left\{ \frac{r_0}{\lambda} \ln\left(\frac{K_0}{K}\right) + \frac{1}{\lambda^2} \ln\left(\frac{K_0}{K}\right)^2 \right\}$$