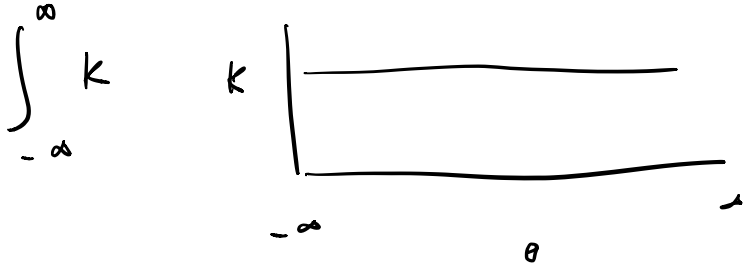
$p(\theta) \propto k \qquad -\infty < \theta < \infty$

Exercise: $\int_{-\infty}^{\infty} k$




(1) If likelihood, prior are both proper density functions $\rightarrow$ posterior must be a proper density function.

$$\underbrace{p(\theta|x)}_{\text{Normal}} \propto \frac{\overbrace{p(x|\theta)}^{\text{Normal}}\ \overbrace{p(\theta)}^{\text{Normal}}}{p(x)} \quad \checkmark$$

(2) Suppose the likelihood is a proper density function.

Suppose $p(\theta)$ is improper meaning

$$\int_{\theta} p(\theta) = \infty.$$

You must check $\int_{\theta} p(\theta|x)\, d\theta = 1$

Ex: Normal - Uniform $\rightarrow$ Normal