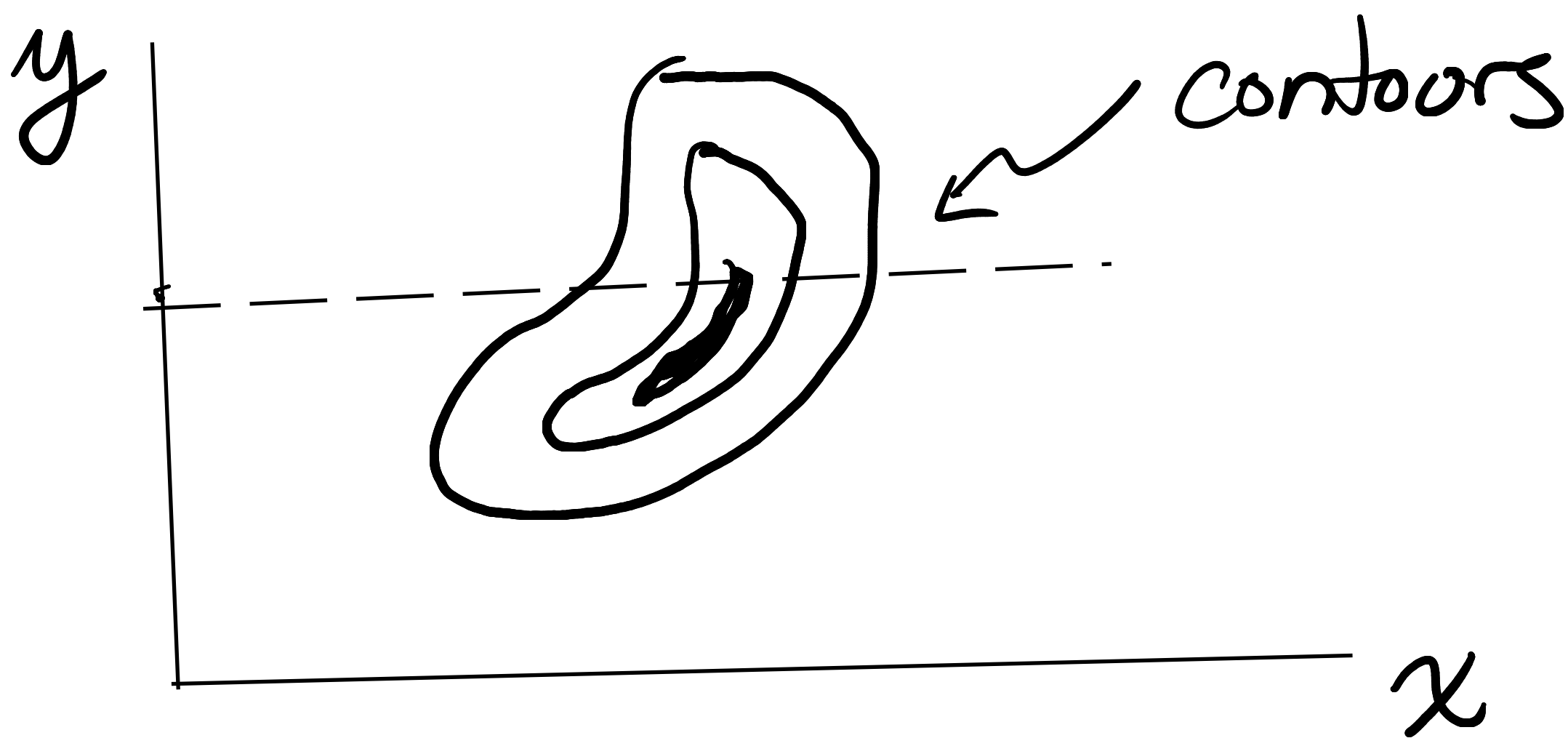# Probability and Statistics

probability density function (PDF): $p(x)$

where $\int_{-\infty}^{\infty} p(x)\,dx = 1$

Joint probability over two parameters : $p(x,y)$

A "slice" through a joint density is a <u>conditional</u> probability density:

$$p(x|y)$$

A 1-D (in this case) PDF over x
<u>given</u> some value of y

The joint density can be written in terms of conditional probabilities

$$p(x,y) = p(x|y)p(y) = p(y|x)p(x)$$

Rearranging terms gives us <u>Bayes' theorem</u>:

$$p(x|y) = \frac{p(x)p(y|x)}{p(y)}$$

Rejection Sampling

target density : $p(x)$

sampling density : $g(x)$

scaling parameter : k

1. Draw samples from $g(x)$:

$$z \sim g(x)$$

2) Draw values uniformly between 0 and $k \cdot g(z)$

$$u \sim U(0, k \cdot g(z))$$

3) Reject samples w/ $u > p(z)$, keep the rest