

MATH40005 Problem Sheet 10 Question 3

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Introduction

The probability density function of a normal distribution with mean μ and variance σ^2 is

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left(-\frac{(x-\mu)^2}{2\sigma^2}\right) \quad (1)$$

A histogram

```
# set the mean and standard deviation for a normal distribution,  
# choose your own parameter values  
mu <- 5  
sigma <- 1  
  
# generate observations following a normal distribution with those parameter values  
set.seed(1)  
z <- rnorm(n=10000, mean=mu, sd=sigma)  
  
# plotting the data, with a histogram and overlaying a density  
hist(z, freq=FALSE)  
k <- 5  
x <- seq(from=mu-k*sigma, to=mu+k*sigma, by=0.01)  
y <- dnorm(x, mean=mu, sd=sigma)  
lines(x=x, y=y, type='l', lwd=2, col="blue")
```

