

ST425 Exercise XX

You

Question 1

1(a)

The mean of a random variable X , of which support is $(-\infty, \infty)$, can be obtained by

$$\mathbb{E}(X) = \int_{-\infty}^{\infty} f(x)dx$$

where $f(x)$ is the pdf.

1(b)

Adding aligned equations.

$$\begin{aligned}\text{Var}(x) &= \mathbb{E}[(X - \mathbb{E}(X))(X - \mathbb{E}(X))] \\ &= \mathbb{E}(X^2) - (\mathbb{E}(X))^2\end{aligned}$$

Question 2

2(a)

Adding R code.

```
1 library(ggplot2)
2 set.seed(1234)
3
4 n <- 1000
5 x_norm1 <- rnorm(n = n, mean = 0, sd = 1)
6 x_norm2 <- rnorm(n = n, mean = 1, sd = 2)
7 dat <- data.frame(dist = factor(rep(c("mu=0 sig=1", "mu=1 sig=2"), each = n)),
8                           x = c(x_norm1, x_norm2))
9
10 p <- ggplot(dat, aes(x=x, fill = dist, color = dist)) +
11   geom_histogram(aes(y=..density..), binwidth=.4, alpha=.5, position="identity") +
12   geom_density(alpha=.3)
13 p
```

2(b)

Adding figures.

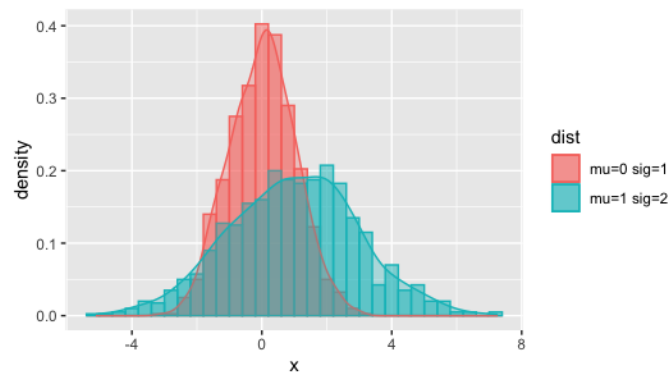


Figure 1: R plot