

# Assignment 4

anonymous

## 1 General information

### ! Reporting accuracy

**For posterior statistics of interest, only report digits for which the Monte Carlo standard error (MCSE) is zero.**

*Example:* If you estimate  $E(\mu) = 1.234$  with  $\text{MCSE}(E(\mu)) = 0.01$ , you should report  $E(\mu) = 1.2$ .

## 2 Bioassay model

### 2.1 (a)

### 2.2 (b)

Loading the library and the data.

```
# Useful functions: quantile()
# and mcse_quantile() (from aaltobda)

data("bioassay_posterior")
# The 4000 draws are now stored in the variable `bioassay_posterior`.
# The below displays the first rows of the data:
head(bioassay_posterior)
```

|   | alpha       | beta      |
|---|-------------|-----------|
| 1 | -0.02050577 | 10.032841 |
| 2 | 1.21738518  | 4.504546  |
| 3 | 3.04829407  | 16.239424 |
| 4 | 1.32272770  | 4.924268  |
| 5 | 1.36274817  | 12.880561 |
| 6 | 1.08593225  | 5.943731  |

## 3 Importance sampling

### 3.1 (c)

```
# Useful functions: bioassaylp (from aaltobda)
alpha_test = c(1.896, -3.6, 0.374, 0.964, -3.123, -1.581)
beta_test = c(24.76, 20.04, 6.15, 18.65, 8.16, 17.4)

log_importance_weights <- function(alpha, beta) {
  # Do computation here, and return as below.
  # This is the correct return value for the test data provided above.
  c(-8.95, -23.47, -6.02, -8.13, -16.61, -14.57)
}
```

### 3.2 (d)

```
normalized_importance_weights <- function(alpha, beta) {
  # Do computation here, and return as below.
  # This is the correct return value for the test data provided above.
  c(0.045, 0.000, 0.852, 0.103, 0.000, 0.000)
}
```

### 3.3 (e)

Write your answers and code here!

### 3.4 (f)

```
S_eff <- function(alpha, beta) {
  # Do computation here, and return as below.
  # This is the correct return value for the test data provided above.
  1.354
}
```

### 3.5 (g)

### 3.6 (h)

```
posterior_mean <- function(alpha, beta) {
  # Do computation here, and return as below.
  # This is the correct return value for the test data provided above.
  c(0.503, 8.275)
}
```