# MAST90139 Assignment 2

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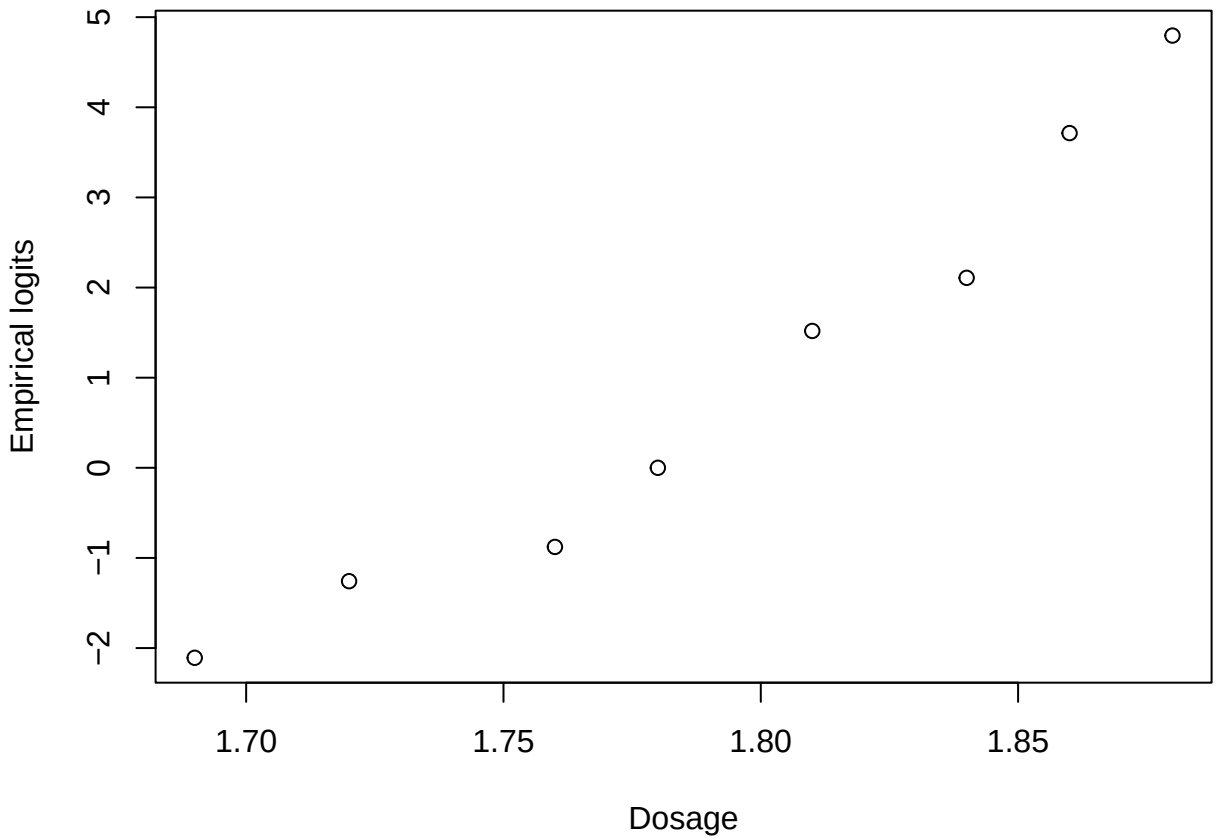
### Question 1a

```
x <- c(1.69, 1.72, 1.76, 1.78, 1.81, 1.84, 1.86, 1.88)
n <- c(59, 60, 62, 56, 63, 59, 62, 60)
y <- c(6, 13, 18, 28, 52, 53, 61, 60)

## Compute the empirical logit
emp.logit <- log((y + 0.5)/(n - y + 0.5))
par(mar=c(4,4,1,1))
plot(x, emp.logit, xlab = 'Dosage', ylab = 'Empirical logits')
```




We can see there's a somewhat linear trend presented in the plot.

## Question 1b

```
logistic <- glm(y/n ~ x, family = binomial, weights = n)
summary(logistic)$coef
```

```
##              Estimate Std. Error   z value     Pr(>|z|)
## (Intercept) -60.10328   5.164164 -11.63853 2.624971e-31
## x            33.93416   2.902867  11.68988 1.435908e-31
```

The estimate for the intercept is -60.10328, and the slope is 33.93416.

## Question 1c

```
confint(logistic)
```

```
## Waiting for profiling to be done...
```

```
##                 2.5 %    97.5 %
## (Intercept) -70.82046 -50.51280
## x            28.54467  39.96005
```

The 95% confidence interval for the slope is (28.54467, 39.96005).

## Question 1d

Given that $logit(0.5) = \frac{0.5}{1-0.5} = 0$.

$$-60.1033 + 33.9341 \times dosage = 0$$

Solving the above equation yields dosage = 1.7712. Therefore, the estimate of the dosage that will kill 50% of the beetles is 1.7712.