

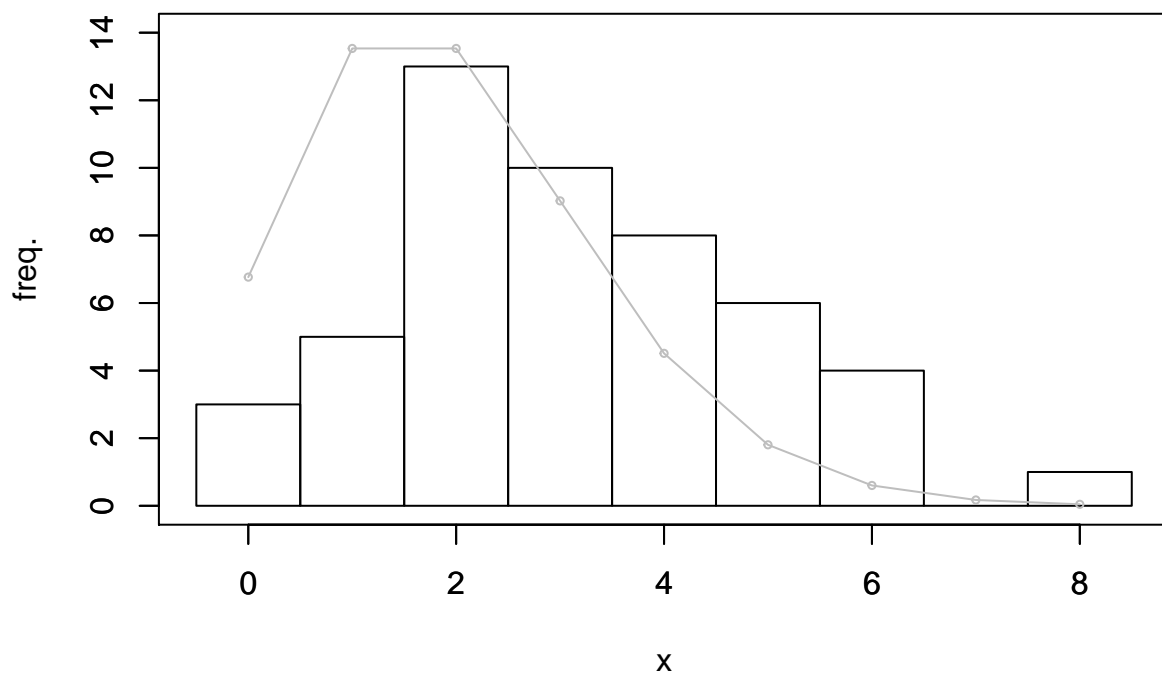
note12

Matts966

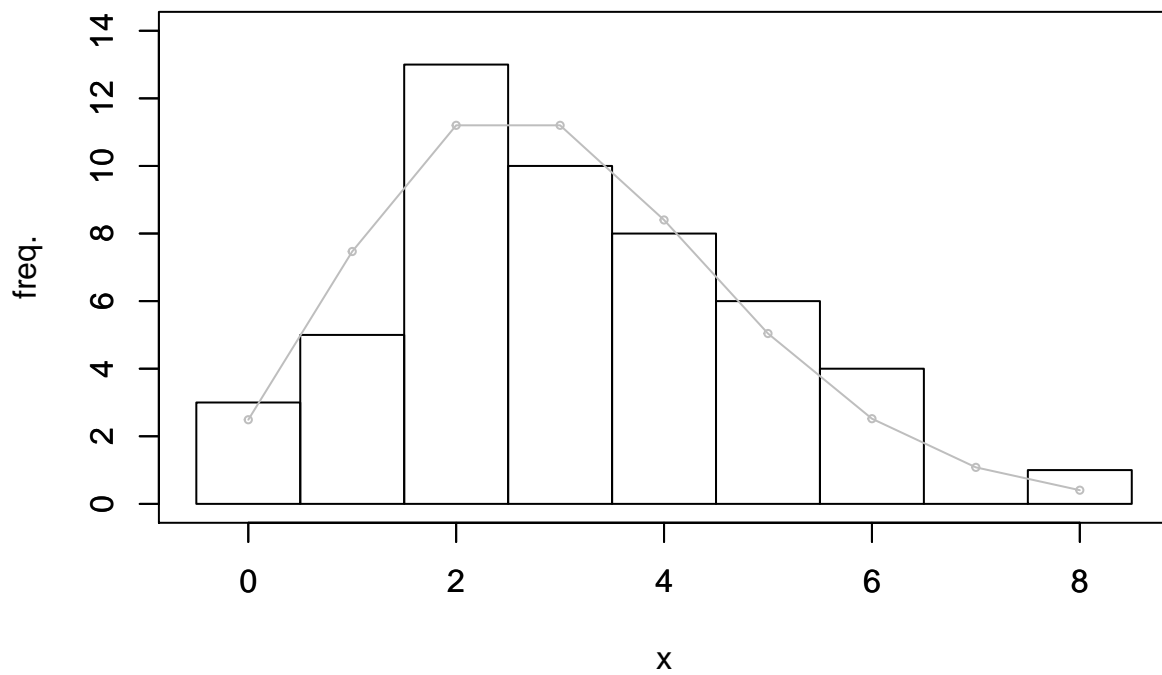
2018/01/30

```
set.seed(123)

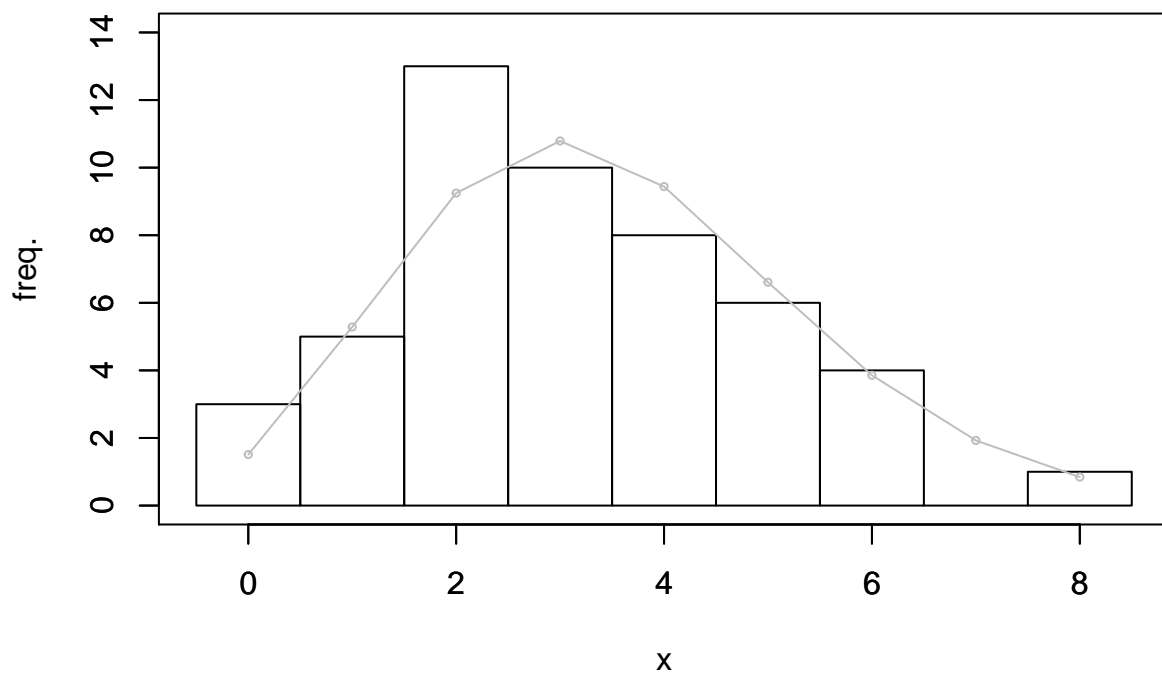
# type=o はオーバーラップ
l <- 3
d <- rpois(50, lambda=1)
hist(d, ylim=c(0, 14), breaks=c(-0.5:8.5), xlab="x", ylab="freq.", main="")
par(new=T)
x <- seq(0, 8, 1)
y <- 50*dpois(x, lambda=2)
plot(x, y, xlab="", ylab="", xlim=c(-0.5, 8.5), ylim=c(0, 14), type="o", col="grey", cex=0.5)
```



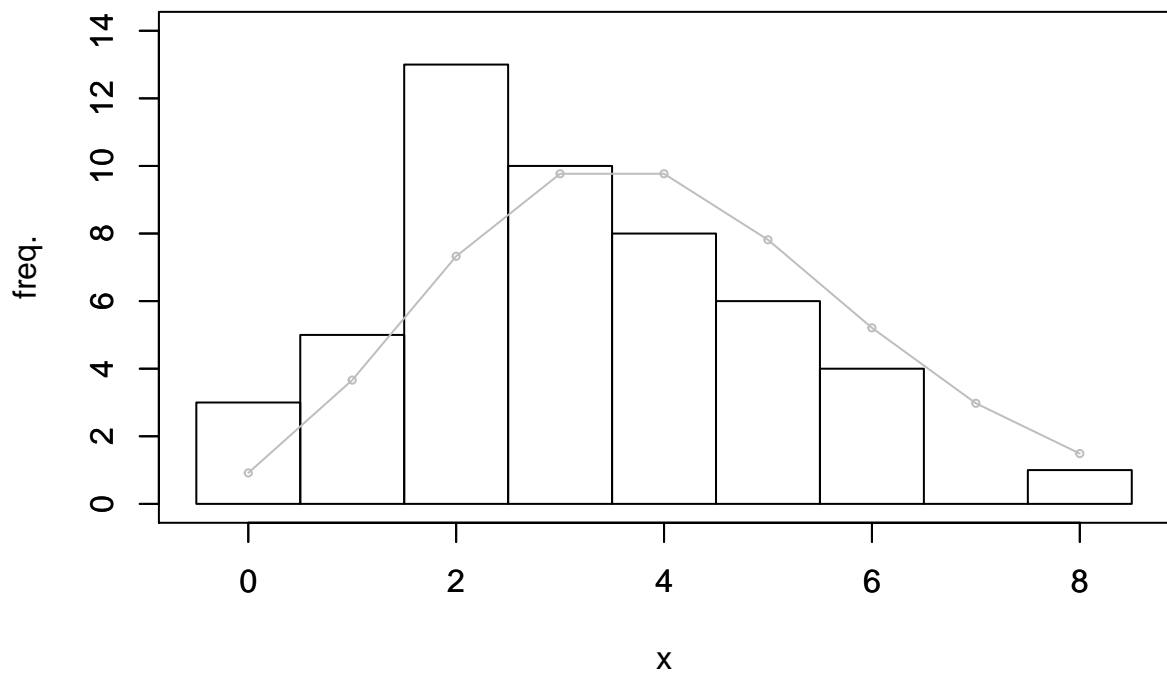
```
hist(d, ylim=c(0, 14), breaks=c(-0.5:8.5), xlab="x", ylab="freq.", main="")
par(new=T)
x <- seq(0, 8, 1)
y <- 50*dpois(x, lambda=3)
plot(x, y, xlab="", ylab="", xlim=c(-0.5, 8.5), ylim=c(0, 14), type="o", col="grey", cex=0.5)
```



```
hist(d, ylim=c(0, 14), breaks=c(-0.5:8.5), xlab="x", ylab="freq.", main="")
par(new=T)
x <- seq(0, 8, 1)
y <- 50*dpois(x, lambda=3.5)
plot(x, y, xlab="", ylab="", xlim=c(-0.5, 8.5), ylim=c(0, 14), type="o", col="grey", cex=0.5)
```



```
hist(d, ylim=c(0, 14), breaks=c(-0.5:8.5), xlab="x", ylab="freq.", main="")
par(new=T)
x <- seq(0, 8, 1)
y <- 50*dpois(x, lambda=4)
plot(x, y, xlab="", ylab="", xlim=c(-0.5, 8.5), ylim=c(0, 14), type="o", col="grey", cex=0.5)
```



```
set.seed(123)
l <- 3
d <- rpois(50, lambda=1)

logL <- sum(dpois(d, 2.0, log=T))
logL
```

```
## [1] -110.5617
```

```
logL <- sum(dpois(d, 3.0, log=T))
logL
```

```
## [1] -97.71459
```

```
logL <- sum(dpois(d, 3.5, log=T))
logL
```

```
## [1] -98.82124
```

```
logL <- sum(dpois(d, 4.0, log=T))
logL
```

```
## [1] -103.1239
```

```
# AICを計算して最小を提示
AIC = -2 * (-97.71459) + 2 * 2
AIC
```

```
## [1] 199.4292
```

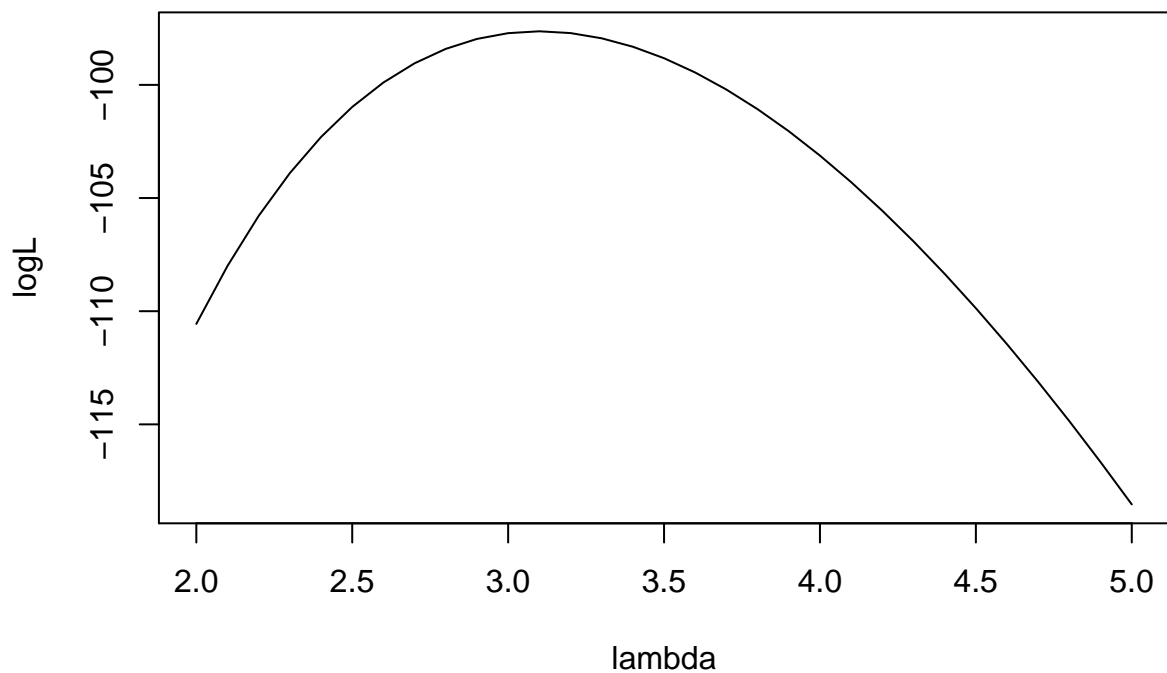
```
# よって lambda3.0で AIC 最小
```

```

set.seed(123)
l <- 3
d <- rpois(50, lambda=l)

logL <- function(m) sum(dpois(d, m, log=T))
lambda <- seq(2, 5, 0.1)
plot(lambda, sapply(lambda, logL), type="l", xlim=c(2, 5), xlab="lambda", ylab="logL")

```



```

setwd("/Users/masahiromatsui/Dropbox/R/R で学ぶ統計学入門図版作成用（改訂版）/付録/")

```

```

setwd("/Users/masahiromatsui/Dropbox/R/R で学ぶ統計学入門図版作成用（改訂版）/付録/")
d <- read.csv("table10-2.csv")
result <- glm(cbind(d$dead, 1-d$dead) ~ d$dose, family=binomial(logit))
logLik(result)

```

```
## 'log Lik.' -6.781799 (df=2)
```

```

AIC = -2 * (-6.781799) + 2 * 2
AIC

```

```
## [1] 17.5636
```

```

setwd("/Users/masahiromatsui/Dropbox/R/R で学ぶ統計学入門図版作成用（改訂版）/付録/")
d <- read.csv("table10-3.csv")
result <- glm(d$flw ~ d$wt, family=poisson)
logLik(result)

```

```
## 'log Lik.' -82.84586 (df=2)
```

```
AIC = -2 * (-82.84586) + 2 * 2
AIC
```

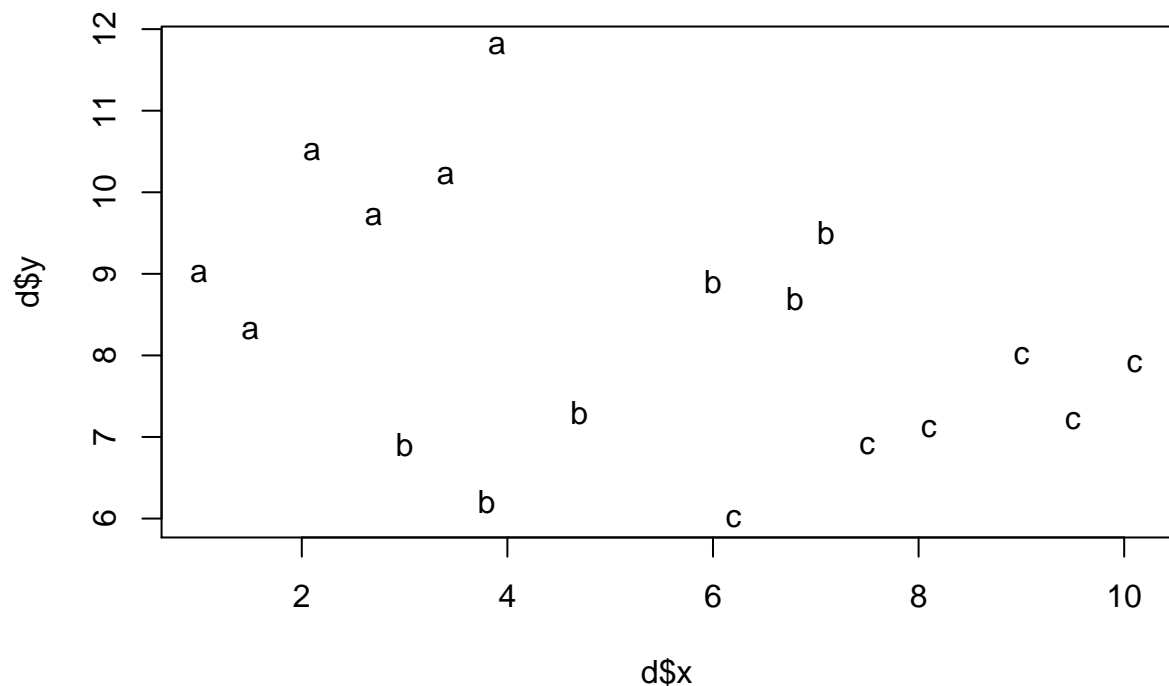
```
## [1] 169.6917
```

```
library(lme4)
```

```
## Loading required package: Matrix
```

```
setwd("/Users/masahiromatsui/Dropbox/R/Rで学ぶ統計学入門図版作成用（改訂版）/付録/")
```

```
d <- read.csv("table11-1.csv")
plot(d$y ~ d$x, pch=as.character(d$block))
```



```
res.1 <- glmer(d$y ~ d$x + (1|d$block), family=gaussian(link = identity))
```

```
## Warning in glmer(d$y ~ d$x + (1 | d$block), family = gaussian(link =
## identity)): calling glmer() with family=gaussian (identity link) as a
## shortcut to lmer() is deprecated; please call lmer() directly
```

```
res.2 <- lmer(d$y ~ d$x + (1|d$block))
```

```
summary(res.1)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: d$y ~ d$x + (1 | d$block)
##
## REML criterion at convergence: 45.9
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
```

```
## -1.6493 -0.5949 0.1023 0.6671 1.5821
##
## Random effects:
## Groups Name Variance Std.Dev.
## d$block (Intercept) 11.0023 3.3170
## Residual 0.3631 0.6026
## Number of obs: 18, groups: d$block, 3
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 4.8738 2.0063 2.429
## d$x 0.6470 0.1085 5.962
##
## Correlation of Fixed Effects:
## (Intr)
## d$x -0.290
```

```
summary(res.2)
```

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: d$y ~ d$x + (1 | d$block)
##
## REML criterion at convergence: 45.9
##
## Scaled residuals:
## Min 1Q Median 3Q Max
## -1.6493 -0.5949 0.1023 0.6671 1.5821
##
## Random effects:
## Groups Name Variance Std.Dev.
## d$block (Intercept) 11.0023 3.3170
## Residual 0.3631 0.6026
## Number of obs: 18, groups: d$block, 3
##
## Fixed effects:
## Estimate Std. Error t value
## (Intercept) 4.8738 2.0063 2.429
## d$x 0.6470 0.1085 5.962
##
## Correlation of Fixed Effects:
## (Intr)
## d$x -0.290
```

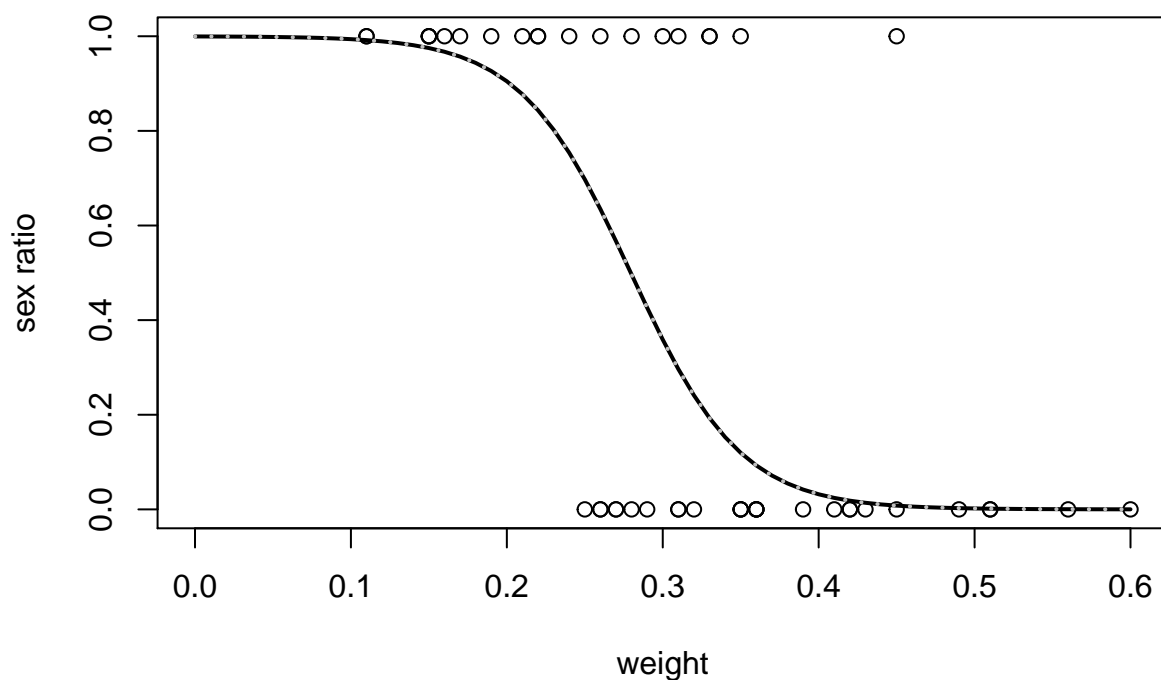
```
setwd("/Users/masahiromatsui/Dropbox/R/Rで学ぶ統計学入門図版作成用(改訂版)/付録/")
d <- read.csv("table11-3.csv")
```

```
matrix(c(d$y), nrow=4, ncol=12)
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10] [,11] [,12]
## [1,]    1    1    1    1    0    1    1    0    0    0    1    0
## [2,]    1    1    1    1    1    0    0    0    0    0    0    0
## [3,]    1    1    1    0    0    1    0    0    0    0    1    0
## [4,]    0    0    1    0    0    0    1    0    0    0    1    0
```

ここから

```
setwd("/Users/masahiromatsui/Dropbox/R/R で学ぶ統計学入門図版作成用（改訂版）/付録/")
library(lme4)
library(glmmML)
d <- read.csv("table11-3.csv")
mother <- as.factor(d$mother)
wt <- d$wt
y <- d$y
res.1 <- glmer(y ~ wt + (1|mother), family=binomial(logit))
res.1 <- summary(res.1)
res.2 <- glmmML(y ~ wt, cluster=mother)
plot(d$wt, d$y, xlab="weight", ylab="sex ratio", xlim=c(0, 0.6))
pred.wt <- seq(0, 0.6, 0.01)
pred.y1 <- 1/(1+exp(-(res.1$coefficient[1] + res.1$coefficient[2]*pred.wt)))
pred.y2 <- 1/(1+exp(-(res.2$coefficient[1] + res.2$coefficient[2]*pred.wt)))
lines(pred.wt, pred.y1, lwd=2, col="black")
lines(pred.wt, pred.y2, lwd=2, col="grey", lty=3)
```



```
# 演習 11-1
setwd("/Users/masahiromatsui/Dropbox/R/Rで学ぶ統計学入門図版作成用（改訂版）/付録/")
library(lme4)
library(glmmML)
d <- read.csv("enshu11-1.csv")
cond <- as.factor(d$cond)
x <- d$x
y <- as.factor(d$y)
res.1 <- glmer(y ~ x + (1|cond), family=binomial(logit))
res.1 <- summary(res.1)
res.2 <- glmmML(y ~ x , cluster=cond)
```

```
## Warning in model.response(mf, "numeric"): using type = "numeric" with a
## factor response will be ignored
```

```
res.1

## Generalized linear mixed model fit by maximum likelihood (Laplace
## Approximation) [glmerMod]
## Family: binomial ( logit )
## Formula: y ~ x + (1 | cond)
##
##           AIC          BIC    logLik deviance df.resid
##          23.0          26.5     -8.5     17.0        21
##
## Scaled residuals:
##      Min       1Q   Median       3Q      Max
## -2.44746  0.07865  0.17926  0.40859  1.40601
##
## Random effects:
##  Groups Name      Variance Std.Dev.
##  cond   (Intercept) 0          0
## Number of obs: 24, groups:  cond, 8
##
## Fixed effects:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -2.0546     1.4785  -1.390  0.1646
## x             0.9154     0.4446   2.059  0.0395 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation of Fixed Effects:
##  (Intr)
## x -0.912
```



```

print('-----

## [1] "-----
"

res.2

##
## Call:  glmmML(formula = y ~ x, cluster = cond)
##
##
##              coef se(coef)      z Pr(>|z|)
## (Intercept) -2.0546   1.4785 -1.390  0.1650
## x           0.9154   0.4446  2.059  0.0395
##
## Scale parameter in mixing distribution:  2.66e-07 gaussian
## Std. Error:                             0.6805
##
##      LR p-value for H_0: sigma = 0:  0.5
##
## Residual deviance: 16.96 on 21 degrees of freedom    AIC: 22.96

```

【考察】 p-value 0.0395 で効果が検出された。