# wafer

*Heejung Shim*

**the main question of interest is whether the presense of particles on the wafer affects the quality outcome. Generate a data frame for the data.**

```
y <- c(320, 14, 80, 36)
particle <- gl(2, 1, 4, labels=c("no","yes"))
quality <- gl(2, 2, 4, labels=c("good","bad"))
(wafer <- data.frame(y, particle, quality))
```

```
##     y particle quality
## 1 320       no    good
## 2  14      yes    good
## 3  80       no     bad
## 4  36      yes     bad
```

```
# view the data frame as a table
(ov <- xtabs(y ~ quality + particle))
```

```
##         particle
## quality  no yes
##    good 320  14
##    bad   80  36
```

### multinomial model

```
# marginal proportions for particle values
(pp <- prop.table( xtabs(y ~ particle)))
```

```
## particle
##        no       yes
## 0.8888889 0.1111111
```

```
# marginal proportions for quality values
(qp <- prop.table( xtabs(y ~ quality)))
```

```
## quality
##      good       bad
## 0.7422222 0.2577778
```

```
# fitted values, mu_ij
(fv <- outer(qp,pp)*450)
```

```
##        particle
## quality       no      yes
##    good 296.8889 37.11111
##    bad  103.1111 12.88889
```

```
# deviance (on 1 d.f.)
2*sum(ov*log(ov/fv))
```

```
## [1] 54.03045
```

```
pchisq(54.03, 1, lower.tail=FALSE)
```

```
## [1] 1.974517e-13
```

### poisson model

```
modl <- glm(y ~ particle + quality, poisson)
deviance(modl)
```

```
## [1] 54.03045
```

```
# pearson's chisquared stat
sum(residuals(modl, type="pearson")^2)
```

```
## [1] 62.81231
```