Dans ce document figurent des sorties obtenues à partir de la base de données suivantes,

```
> base=read.table("http://freakonometrics.free.fr/baseaffairs.txt",header=TRUE)
> tail(base)
    SEX AGE YEARMARRIAGE CHILDREN RELIGIOUS EDUCATION OCCUPATION SATISFACTION Y
596   1  47         15.0        1         3        16          4            2 7
597   1  22          1.5        1         1        12          2            5 1
598   0  32         10.0        1         2        18          5            4 6
599   1  32         10.0        1         2        17          6            5 2
600   1  22          7.0        1         3        18          6            2 2
601   0  32         15.0        1         3        14          1            5 1
```

Il s'agit d'une base construite à partir des données de l'article *A Theory of Extramarital Affairs*, de Ray Fair, paru en 1978 dans *Journal of Political Economy*, avec 563 observations.

- Y: nombre d'aventures extra-conjugales hétérosexuelles pendant l'année passée
- SEX: 0 pour une femme, et 1 pour un homme
- AGE: âge de la personne interrogée
- YEARMARRIAGE: nombre d'années de mariage
- CHILDREN: 0 si la personne n'a pas d'enfants (avec son épouse) et 1 si elle en a
- RELIGIOUS: degré de "religiosité", entre 1 (anti-religieuse) à 5 (très religieuse)
- EDUCATION: nombre d'années d'éducation, 9=grade school, 12=high school, à 20=PhD
- OCCUPATION: construit suivant l'échelle d'Hollingshead
  - Higher executives of large concerns, proprietors, and major professionals (1)
  - Business managers, proprietors of medium-sized businesses, and lesser professionals (2)
  - Administrative personnel, owners of small businesses, and minor professionals (3)
  - Clerical and sales workers, technicians, and owners of little businesses (4)
  - Skilled manual employees (5)
  - Machine operators and semiskilled employees (6)
  - Unskilled employees (7)
- SATISFACTION: perception de son mariage, de très mécontente (1) à très contente (5)

Afin de faciliter l'analyse, deux variables ont été créées,

- ENFANTS: OUI si la personne en a, NON sinon
- SEXE: F pour une femme, et H pour un homme

```
> base$SEXE="H"
> base$SEXE[base$SEX=="0"]="F"
> base$SEXE=as.factor(base$SEXE)
> table(base$SEXE)

  F   H
295 268
```

```
> base$ENFANT="OUI"
> base$ENFANT[base$CHILDREN==0]="NON"
> base$ENFANT=as.factor(base$ENFANT)
> table(base$ENFANT)

NON OUI
164 399
> table(base$CHILDREN)

  0   1
164 399
```

Sortie 1

```
> nrow(base)
[1] 563
> mean(base$Y)
[1] 0.6305506
> table(base$Y)

  0   1   2   3   4   5   6   7   8  10
451  34  17  19  12  11  11   5   2   1

>  base$Y0=(base$Y>0)
>  table(base$Y0)

FALSE  TRUE
  451   112
```

Sortie 2

```
> regbernoulli = glm(Y0~0+YEARMARRIAGE+SEXE,data=base,
+ family=binomial(link="logit"))
> summary(regbernoulli)

Call:
glm(formula = Y0 ~ 0 + YEARMARRIAGE + SEXE, family = binomial(link =
"logit"),
    data = base)

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
YEARMARRIAGE  0.03738    0.01911   1.957   0.0504 .
SEXEF        -1.84763    0.22411  -8.244  < 2e-16 ***
SEXEH        -1.55898    0.22281  -6.997 2.62e-12 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 780.48  on 563  degrees of freedom
Residual deviance: 555.94  on 560  degrees of freedom
AIC: 561.94

Number of Fisher Scoring iterations: 4

> regpoisson = glm(Y~0+YEARMARRIAGE+SEXE,data=base,
+ family=poisson(link="log"))
> summary(regpoisson)

Call:
glm(formula = Y ~ 0 + YEARMARRIAGE + SEXE, family = poisson(link =
"log"),
    data = base)

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
YEARMARRIAGE  0.044486   0.009633   4.618 3.88e-06 ***
SEXEF        -0.947094   0.117609  -8.053 8.08e-16 ***
SEXEH        -0.746552   0.116919  -6.385 1.71e-10 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

    Null deviance: 1383.8  on 563  degrees of freedom
Residual deviance: 1269.6  on 560  degrees of freedom
AIC: 1593.6

Number of Fisher Scoring iterations: 6
```

Sortie 3

```
> regpoisson2 = glm(Y~ENFANT+YEARMARRIAGE+SEXE+AGE+RELIGIOUS+
+ SATISFACTION+EDUCATION,data=base,family=poisson(link="log"))
> summary(regpoisson2)

Call:
glm(formula = Y ~ ENFANT + YEARMARRIAGE + SEXE + AGE + RELIGIOUS +
    SATISFACTION + EDUCATION, family = poisson(link = "log"),
    data = base)
```

```
Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -0.119541   0.501611  -0.238  0.81164
ENFANTOUI     0.486828   0.170638   2.853  0.00433 **
YEARMARRIAGE  0.074466   0.017126   4.348 1.37e-05 ***
SEXEH         0.059154   0.122693   0.482  0.62972
AGE          -0.040471   0.009899  -4.088 4.35e-05 ***
RELIGIOUS    -0.254586   0.048492  -5.250 1.52e-07 ***
SATISFACTION -0.363964   0.045780  -7.950 1.86e-15 ***
EDUCATION     0.124790   0.026270   4.750 2.03e-06 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

    Null deviance: 1295.2  on 562  degrees of freedom
Residual deviance: 1133.0  on 555  degrees of freedom
AIC: 1467.1

Number of Fisher Scoring iterations: 6
```

Sortie 4

```
> regpoisson2b = glm(Y~0+YEARMARRIAGE+AGE+RELIGIOUS+SATISFACTION+
+ EDUCATION,data=base,family=poisson(link="log"))
> summary(regpoisson2b)

Call:
glm(formula = Y ~ 0 + YEARMARRIAGE + AGE + RELIGIOUS + SATISFACTION +
    EDUCATION, family = poisson(link = "log"), data = base)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-2.7593  -1.1327  -0.8639  -0.6079   5.8815

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
YEARMARRIAGE  0.093324   0.015403   6.059 1.37e-09 ***
AGE          -0.040267   0.009197  -4.378 1.20e-05 ***
RELIGIOUS    -0.250055   0.046962  -5.325 1.01e-07 ***
SATISFACTION -0.376590   0.043512  -8.655  < 2e-16 ***
EDUCATION     0.134005   0.016405   8.169 3.12e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)
```

```
      Null deviance: 1383.8  on 563  degrees of freedom
Residual deviance: 1142.1  on 558  degrees of freedom
AIC: 1470.2

Number of Fisher Scoring iterations: 6
```

Sortie 5

```
> regpoisson3=glm(Y~0+YEARMARRIAGE+AGE+RELIGIOUS+
+ as.factor(SATISFACTION)+EDUCATION,data=base,
+ family=poisson(link="log"))
> summary(regpoisson3)

Call:
glm(formula = Y ~ 0 + YEARMARRIAGE + AGE + RELIGIOUS +
as.factor(SATISFACTION) +
    EDUCATION, family = poisson(link = "log"), data = base)

Deviance Residuals:
    Min      1Q   Median      3Q      Max
-2.7344  -1.1741  -0.8139  -0.5244   5.4286

Coefficients:
                          Estimate Std. Error z value Pr(>|z|)
YEARMARRIAGE              0.088831   0.015735   5.645 1.65e-08 ***
AGE                     -0.041553   0.009784  -4.247 2.17e-05 ***
RELIGIOUS               -0.247346   0.048498  -5.100 3.39e-07 ***
as.factor(SATISFACTION)1 -0.593474  0.506405  -1.172   0.2412
as.factor(SATISFACTION)2 -0.360428  0.451006  -0.799   0.4242
as.factor(SATISFACTION)3 -0.852263  0.453104  -1.881   0.0600 .
as.factor(SATISFACTION)4 -0.906171  0.453866  -1.997   0.0459 *
as.factor(SATISFACTION)5 -1.937049  0.453124  -4.275 1.91e-05 ***
EDUCATION                0.118942   0.023497   5.062 4.15e-07 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

      Null deviance: 1383.8  on 563  degrees of freedom
Residual deviance: 1117.8  on 554  degrees of freedom
AIC: 1453.9

Number of Fisher Scoring iterations: 6
```

Sortie 6

```
> regqpoisson = glm(Y~0+YEARMARRIAGE+AGE+RELIGIOUS+SATISFACTION+
+ EDUCATION,data=base,family=quasipoisson(link="log"))
> summary(regqpoisson)

Call:
glm(formula = Y ~ 0 + YEARMARRIAGE + AGE + RELIGIOUS + SATISFACTION +
    EDUCATION, family = quasipoisson(link = "log"), data = base)

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
YEARMARRIAGE  0.09332    0.02893   3.225  0.00133 **
AGE          -0.04027    0.01728  -2.331  0.02012 *
RELIGIOUS    -0.25005    0.08822  -2.835  0.00476 **
SATISFACTION -0.37659    0.08174  -4.607 5.06e-06 ***
EDUCATION     0.13400    0.03082   4.349 1.63e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for quasipoisson family taken to be 3.528555)

      Null deviance: 1383.8  on 563  degrees of freedom
Residual deviance: 1142.1  on 558  degrees of freedom
AIC: NA

Number of Fisher Scoring iterations: 6


> library(MASS)
> regnegbin = glm.nb(Y~0+YEARMARRIAGE+AGE+RELIGIOUS+
+ SATISFACTION+EDUCATION,data=base)
> summary(regnegbin)

Call:
glm.nb(formula = Y ~ 0 + YEARMARRIAGE + AGE + RELIGIOUS + SATISFACTION
+
    EDUCATION, data = base, init.theta = 0.1609544585, link = log)

Deviance Residuals:
    Min      1Q   Median      3Q      Max
-1.0509  -0.7150  -0.5972  -0.4699   2.1926

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
```

```
YEARMARRIAGE  0.10588    0.03563   2.971 0.002967 **
AGE          -0.04584    0.02060  -2.226 0.026045 *
RELIGIOUS    -0.24616    0.10614  -2.319 0.020386 *
SATISFACTION -0.44546    0.10813  -4.120 3.79e-05 ***
EDUCATION     0.15312    0.03938   3.888 0.000101 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for Negative Binomial(0.161) family taken to be
1)

    Null deviance: 327.60  on 563  degrees of freedom
Residual deviance: 279.45  on 558  degrees of freedom
AIC: 1001.5

Number of Fisher Scoring iterations: 1


             Theta:  0.1610
          Std. Err.:  0.0232


 2 x log-likelihood:  -989.5430
```

Sortie 7

```
> library(pscl)
> regzeroinfl1=zeroinfl(Y~0+YEARMARRIAGE+AGE+RELIGIOUS+
+ SATISFACTION+EDUCATION|1,dist="poisson",link="logit",data=base)
> summary(regzeroinfl1)

Call:
zeroinfl(formula = Y ~ 0 + YEARMARRIAGE + AGE + RELIGIOUS +
SATISFACTION + EDUCATION | 1, data = base, dist = "poisson", link =
"logit")

Pearson residuals:
    Min      1Q  Median      3Q     Max
-0.4865 -0.4430 -0.4214 -0.3923  7.2787

Count model coefficients (poisson with log link):
             Estimate Std. Error z value Pr(>|z|)
YEARMARRIAGE  0.04366    0.01880   2.322   0.0202 *
AGE          -0.01616    0.01060  -1.525   0.1274
RELIGIOUS    -0.07624    0.05110  -1.492   0.1357
SATISFACTION -0.10319    0.05075  -2.034   0.0420 *
EDUCATION     0.10641    0.01886   5.641 1.69e-08 ***
```

```
Zero-inflation model coefficients (binomial with logit link):
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   1.2531     0.1129    11.1   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Number of iterations in BFGS optimization: 12
Log-likelihood: -499.1 on 6 Df

> regzeroinfl2=zeroinfl(Y~0+YEARMARRIAGE+AGE+RELIGIOUS+
+ EDUCATION | 0+SATISFACTION,dist="poisson",link="logit",data=base)
> summary(regzeroinfl2)

Call:
zeroinfl(formula = Y ~ 0 + YEARMARRIAGE + AGE + RELIGIOUS + EDUCATION |
0 + SATISFACTION, data = base, dist = "poisson", link = "logit")

Pearson residuals:
    Min      1Q  Median      3Q     Max
-0.6811 -0.4340 -0.3697 -0.3402  6.5232

Count model coefficients (poisson with log link):
             Estimate Std. Error z value Pr(>|z|)
YEARMARRIAGE  0.04488    0.01836   2.444   0.0145 *
AGE          -0.01810    0.01045  -1.733   0.0832 .
RELIGIOUS    -0.09250    0.04935  -1.874   0.0609 .
EDUCATION     0.09169    0.01694   5.412 6.25e-08 ***

Zero-inflation model coefficients (binomial with logit link):
             Estimate Std. Error z value Pr(>|z|)
SATISFACTION  0.33689    0.02842   11.85   <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Number of iterations in BFGS optimization: 14
Log-likelihood: -492.2 on 5 Df
```