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      name:  <unnamed>
       log:  /Users/mien/Desktop/ee426/assignment12_6104640328.log
  log type:  text
 opened on:  22 Apr 2021, 00:27:28

1.
. reg y x1 x2 x3 x4

      Source |       SS           df       MS      Number of obs   =       232
-------------+----------------------------------   F(4, 227)       =      5.96
       Model |  44.7298499         4  11.1824625   Prob > F        =    0.0001
    Residual |  425.748598       227  1.87554449   R-squared       =    0.0951
-------------+----------------------------------   Adj R-squared   =    0.0791
       Total |  470.478448       231  2.03670324   Root MSE        =    1.3695

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |   .1016201   .0435073     2.34   0.020     .0158904    .1873499
          x2 |   .1345044   .0462142     2.91   0.004     .0434407     .225568
          x3 |  -.0748194   .0480457    -1.56   0.121    -.1694919    .0198531
          x4 |   .1684563   .0688243     2.45   0.015     .0328401    .3040725
       _cons |   .9568064    .107007     8.94   0.000     .7459523     1.16766
------------------------------------------------------------------------------


2.
. histogram y
(bin=15, start=0, width=.33333333)
We have data limitation where dependent variable is counted data


3.
. poisson y x1 x2 x3 x4

Iteration 0:   log likelihood = -342.88107
Iteration 1:   log likelihood = -342.88107

Poisson regression                              Number of obs     =        232
                                                LR chi2(4)        =      43.33
                                                Prob > chi2       =     0.0000
Log likelihood = -342.88107                     Pseudo R2         =     0.0594

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |   .0971474   .0306762     3.17   0.002     .0370231    .1572717
          x2 |   .1293024   .0330916     3.91   0.000      .064444    .1941607
          x3 |  -.0715533   .0342177    -2.09   0.037    -.1386187   -.0044879
          x4 |   .1734482   .0507707     3.42   0.001     .0739395    .2729569
       _cons |  -.1284876   .0849064    -1.51   0.130     -.294901    .0379259
------------------------------------------------------------------------------

. estat gof

         Deviance goodness-of-fit =  409.4921
         Prob > chi2(227)         =    0.0000

         Pearson goodness-of-fit  =  423.3541
         Prob > chi2(227)         =    0.0000

According to GOF test, we reject H0 so Poisson is not appropriated.

. mfx

Marginal effects after poisson
      y  = Predicted number of events (predict)
         =  .95621703
------------------------------------------------------------------------------
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```
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
      x1 |    .092894      .02882    3.22   0.001   .036403  .149385  -.317697
      x2 |   .1236411       .0308    4.01   0.000   .063277  .184005   .812709
      x3 |  -.0684205      .03246   -2.11   0.035   -.13204 -.004801  -.818103
      x4 |   .1658541      .04736    3.50   0.000   .073022  .258686   -.28275
------------------------------------------------------------------------------

. poisson y x1 x2 x3 x4, ir nolog

Poisson regression                              Number of obs     =        232
                                                LR chi2(4)        =      43.33
                                                Prob > chi2       =     0.0000
Log likelihood = -342.88107                     Pseudo R2         =     0.0594

------------------------------------------------------------------------------
           y |        IRR   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |   1.102023   .0338059     3.17   0.002     1.037717    1.170314
          x2 |   1.138034   .0376594     3.91   0.000     1.066566    1.214291
          x3 |   .9309467   .0318548    -2.09   0.037     .8705599    .9955222
          x4 |   1.189399   .0603866     3.42   0.001     1.076742    1.313844
       _cons |   .8794245   .0746687    -1.51   0.130     .7446053    1.038654
------------------------------------------------------------------------------


4.
. nbreg y x1 x2 x3 x4, ir nolog

Negative binomial regression                    Number of obs     =        232
                                                LR chi2(4)        =      21.24
Dispersion     = mean                           Prob > chi2       =     0.0003
Log likelihood = -317.49278                     Pseudo R2         =     0.0324

------------------------------------------------------------------------------
           y |        IRR   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          x1 |   1.137182   .0576476     2.54   0.011     1.029627    1.255973
          x2 |   1.163009   .0589037     2.98   0.003     1.053105    1.284383
          x3 |   .9349279   .0450052    -1.40   0.162     .8507526    1.027432
          x4 |   1.188428    .084026     2.44   0.015     1.034641    1.365072
       _cons |   .8662692   .1019776    -1.22   0.223     .6877792     1.09108
-------------+----------------------------------------------------------------
    /lnalpha |   .0479945   .2389531                     -.4203449    .5163339
-------------+----------------------------------------------------------------
       alpha |   1.049165   .2507012                      .6568202    1.675872
------------------------------------------------------------------------------
LR test of alpha=0: chibar2(01) = 50.78                Prob >= chibar2 = 0.000

According to overdispersion test, H0 is rejected. Negative Binomial model might
be appropriated since it's already confirmed it's not Poisson.

. mfx

Marginal effects after nbreg
      y  = Predicted number of events (predict)
         =  .94607122
------------------------------------------------------------------------------
variable |      dy/dx    Std. Err.     z    P>|z|  [    95% C.I.   ]      X
---------+--------------------------------------------------------------------
      x1 |   .1216207      .04796    2.54   0.011    .02763  .215611  -.317697
      x2 |   .1428671      .04796    2.98   0.003   .048862  .236872   .812709
      x3 |  -.0636573      .04556   -1.40   0.162  -.152956  .025642  -.818103
      x4 |   .1633214      .06686    2.44   0.015   .032269  .294374   -.28275
------------------------------------------------------------------------------


5.
. zip y x1 x2 x3 x4, inflate(x4) vuong
```

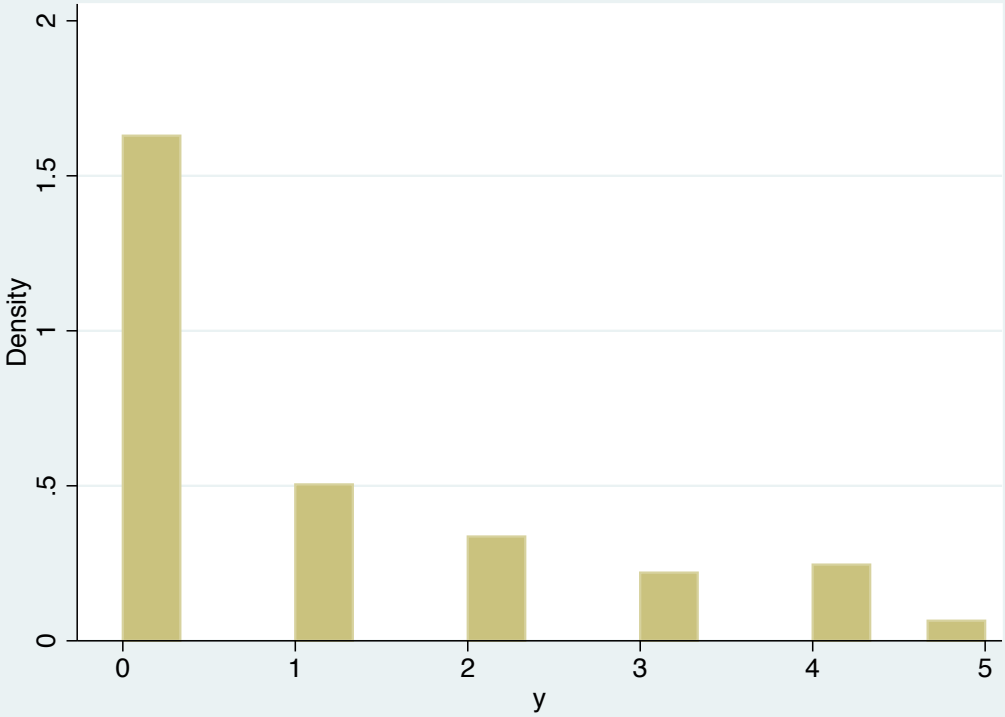
```
Zero-inflated Poisson regression               Number of obs     =        232
                                               Nonzero obs       =        106
                                               Zero obs          =        126

Inflation model = logit                        LR chi2(4)        =      13.13
Log likelihood  = -311.2255                    Prob > chi2       =     0.0106

------------------------------------------------------------------------------
           y |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
y            |
          x1 |   .0962618   .0402556     2.39   0.017     .0173622    .1751613
          x2 |   .0954378   .0373253     2.56   0.011     .0222815     .168594
          x3 |  -.0672218   .0358764    -1.87   0.061    -.1375383    .0030946
          x4 |   .0877817   .0527928     1.66   0.096    -.0156904    .1912537
       _cons |   .4349837   .1120917     3.88   0.000     .2152881    .6546793
-------------+----------------------------------------------------------------
inflate      |
          x4 |  -.2232387   .1282354    -1.74   0.082    -.4745754     .028098
       _cons |  -.3696851   .1945938    -1.90   0.057    -.7510819    .0117117
------------------------------------------------------------------------------
Vuong test of zip vs. standard Poisson:            z =     3.71  Pr>z = 0.0001
```

We reject H0 for Vuong test so the ZIP is appropriated.

6. Now we know that it's not Poisson for sure. However the test for NB and ZIP suggest that either one is appropriated. Looking the individual test, NB gives better result where only x3 is insignificant. The log likelihood of NB is also a bit higher. So NB might be the most appropriated one.


Density
0
.5
1
1.5
2
0
1
2
3
4
5
y